MAY 10, 1923

THE RUBBER AGE

VOL. XIII. NO. 3

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PUBLISHED ON THE 10th AND 25th OF EACH MONTH BY

THE GARDNER, MOFFAT COMPANY, Inc.

ADDRESS ALL CORRESPONDENCE TO BUSINESS AND EDITORIAL ROOMS: 225 FOURTH AVENUE, NEW YORK

Telephone: Stuyvesant 4552

PUBLICATION OFFICE: HIGHLAND, N. Y.

Advertising Forms Close Ten Days Before Date of Publication. Rates for Advertising Will Be Furnished on Application.
Subscription Price: $2.00 per Annum. Single Copies 10 Cents. Canada, $2.50 per Annum. Foreign, $3.00 per Annum.

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GATHERING RUBBER IN AFRICA

THE RUBBER AGE

The Only Twice-a-Month Rubber Publication

VOL. XIII. MAY 10, 1923 No. 3

RUBBER COMPANIES OPERATE AT TOP SPEED

Tire Companies in All Parts of Country Are Working at Capacity—Akron Alone is Producing 110,000 Daily—Production Expected to Slacken Soon.

Most of the rubber companies in the United States are increasing production. Companies located in Akron are turning out about 112,000 tires a day, while smaller rubber concerns are now operating at what will probably be top speed for this year.

The two plants of the Kelly-Springfield Co. in Akron and Cumberland are producing about 7,500 tires a day. This represents an increase of 50 per cent over the operation of a year ago, but does not mark the limits of the company's capacity. Further expansion is predicted before the close of 1923. Goodrich, it is reported, continues production at the rate of 20,000 tires a day. The Goodyear Tire & Rubber Co. which recently turned out over 48,000 casings in a single day, at its Akron plant, plans to increase its output slightly. General, Miller and Firestone, however, are reported to have already reached capacity.

Ohio probably contributes about 60 per cent of the tires manufactured in the United States, and of which amount over 90 per cent are manufactured in Akron alone. Akron production during April has averaged about 110,000 tires daily.

However, the months of May and June will witness a tapering off of production. At the rate the industry is now operating more tires are being produced than can be consumed this year. The summer months, as is usually the case, will see a tapering off of production.

In other rubber lines this condition does not exist. Improvement in the output of mechanical goods, sundries and shoes continues. Collectively farmers are entering the mechanical rubber goods market, while heavy purchases by railroads have considerably increased the activity in the mechanical rubber goods line.

The rubber industry is still experiencing difficulty in obtaining skilled and unskilled labor. All Akron labor is said to be fully employed, the biggest shortage being among skilled laborers. Six or seven dollars a day continues to be a good average for skilled labor, while common labor is receiving about $4.50 a day.

64,013 TIRES PRODUCED IN ONE DAY

The Goodyear Tire and Rubber Company has set a new high production record, when on April 13, 64,013 tires were manufactured in a single 24-hour day. This surpasses the previous high of April 15, 1920 by 25,342 tires.

Three plants contributed to the production acme. The Akron plant on April 13 turned out 48,543 tires; the California factory produced 8,837 casings, while the Canadian plant added another 6,584, making a total of 64,013 tires. The Akron plant's record was about 62 per cent over its average while the total turnout showed about a 40 1/2 per cent increase.

GOODYEAR FILES BILL ON LAMP BLACK RATES

The Goodyear Tire & Rubber Co. has filed a complaint with the Interstate Commerce Commission protesting against the rail rates on carbon black or "lamp black".

All roads entering Akron are made defendants by the Goodyear complaint. The rates of the Chesapeake & Ohio from Lem, Ky., are specially attacked by the Goodyear complaint. The Goodyear company avers that its competitors pay lower rates on lamp black from Elkview and Turner, W. Va., to Akron, despite the fact that the distance from Lem to Akron is practically the same. The comparative rates cited in the complaint are 54½ cents a hundred pounds from Lem over the C. & O. against 38 cents a hundred pounds from Elkview and 43¼ cents from Turner, the latter points being served from the B. & O.

The company avers that it has sustained damages amounting to $6,000 as a result of the higher rates charged from Lem, and asks that the Interstate Commerce Commission order a reduction, putting the C. & O. rate on the same level with that of the B. & O.

DECISION IN RIM SUIT FAVORS FIRESTONE

Judge D. C. Westenhaver, of Cleveland, Recently Handed Down a Decision Regarding the Split Rim Controversy Between Firestone and Universal.

The suit was brought by the Universal Rim Co. of Chicago, Ill., against the Firestone Tire & Rubber Co. and The Firestone Steel Products Co. for infringement of the patent to Erle K. Baker, No. 1,095,755, dated May 5th, 1914. This patent, known throughout the country as the Baker Split Rim Patent, was alleged to cover all forms of split rims such as manufactured by the Firestone companies and others, and affected the greater proportion of the rims manufactured for use on the majority of automobiles.

In summing up Judge Westenhaver said: "Claims 1 and 9 of the patent in suit are invalid because anticipated, and, even if not anticipated, are invalid for want of invention. No opinion is expressed as the validity of claims 2 and 6, but, even if valid, they must be limited to the specific form described and claimed. Defendant's construction does not infringe claims 2 and 6 as thus limited. A decree will be entered in conformity herewith, dismissing plaintiff's bill at cost."

The decision in this case is far reaching and of great importance to the automobile manufacturer and resembles in some respects the famous Perlman rim suit in which the Firestone Company protected the industry from a monoply on demountable rims. The present decision relieves the industry of a monoply sought to be imposed on demountable split rims. As was the case in the Perlman litigation the patent in suit had received considerable recognition on the part of rim manufacturers and many of them were paying royalty to the Universal Rim Company on the patent. Another parallel to the Perlman case is that in the Perlman case a French invention was the principal reliance for the defendant and Perlman attempted to carry back the date of his invention without success, and in the present split rim suit the principal reliance of the defendant was on a French patent which Baker unsuccessfully tried to anticipate by his own alleged earlier invention.

MEXICANS TOOK $2,621,174 IN RUBBER GOODS IN 1922

Total exports of rubber manufactured goods from the United States to Mexico, as reported by the Department of Commerce, Rubber Division, for 1922 were $2,621,174. During the past year Mexico took 79,747 casings, valued at $1,014,935; 78,696 tubes amounting to $167,733, and 3,560 solid tires totaling $78,839. About 90 per cent of Mexico's tire business goes to the United States.

Mexico is also a fertile market for all classes of rubber footwear and clothing, taking goods in 1922 valued at $327,873. Mexico is also an excellent market for American rubber soles and heels, taking in 1922 30 per cent and 28 per cent of value exported. The principal importers of rubber soles and heels are the shoe manufacturers. While Mexico City is the chief center of this industry, another important center is Guadalajara, there being less important factories in other sections of the country.

The Department's monograph states that there is a good demand for rubber gloves among surgeons in Mexico. Wholesale drug dealers distribute such specialties to retail drug stores throughout the country. Hard rubber exports from the U. S. to Mexico including battery jars and accessories valued at $1,015; other electrical supplies, $10,220; other hard rubber goods, $16,021.

Rubber Credit Men Co-Operate

Because tire manufacturers in the New York District have been losing about $250,000 annually through failures of tire dealers, the credit men of 15 of the principal rubber companies have recently organized The Association of Rubber Credit Men. George Webster, credit manager of the Goodyear branch in New York City, is chairman and treasurer of the association, while Lee S. Buckingham is its secretary.

Mr. Webster points out that considerable expense will be eliminated through the co-operation of the various companies working through this association. One attorney will hereafter be employed to represent all companies that have claims against the defunct dealer. The association's primary purpose is to protect both the public and the companies from unscrupulous dealers who suddenly declare themselves bankrupt.

Eclat Builds in Kent

The Eclat Rubber Co. has purchased a strip of land along the Cuyahoga River at Kent, O. Erection of temporary buildings have already begun.

RUBBER PRODUCTION INCREASED FROM 60 TO 75 PER CENT

Cable advices from London inform us as we go to press that the restriction on crude rubber has been modified so as to allow 65% of the normal (1920) production to be released for export instead of the 60%, the percentage permitted up to this time. This is the result of the price which has averaged between 1s. 3d. and 1s. 6d. for the last three months on the London market.

MARKET FOR AMERICAN GOODS IN FRANCE IS POOR

In the opinion of Trade Commissioner Barre, Department of Trade and Commerce, Ottawa, Canada, and published in the Commercial Intelligence Journal of April 21, a thorough study of the French market for rubber goods should be made before entering that field.

France is the fifth largest consumer of rubber in the world, there being 100 rubber manufacturers who employ about 60,000 workers. The tire industry has just commenced to recover from the business and industrial depression. As it is, the Michelin Company controls about 80 per cent of the tire business in that country, and the commissioner believes it useless to attempt to compete with that company there.

He, however, points out that men's garters are wholly imported from American and Canadian firms, but that French manufactures control the suspender field. French factories, on the other hand, supply only 25 per cent of the rubber boots demanded, large quantities of rubber boots being imported from the United States and England. Erasers and sponges are also imported from the United States, while there is a growing demand for American vulcanizers. Telephone receivers and fountain pens are almost entirely imported from the United States and Great Britain.

Dunlop Plans New Districts

Among the first selling districts to be opened up by the Dunlop Tire and Rubber Co. of America will be the Buffalo district which will include portions of Pennsylvania and New York States. In all probability this district will be opened in May. Eventually other large areas in the East will be covered through New York and Philadelphia branches. Later other branches will be opened in the West.

Shipments of Rubber Manufactures from the United States to Non-Contiguous Territories during the Month of February, 1923

	Alaska		Hawaii		Porto Rico	
	Quantity	*Dollars*	*Quantity*	*Dollars*	*Quantity*	*Dollars*
Boots and Shoes .....(Pairs)	4,394	10,625	9,386	11,162	27,615	19,036
Druggists' rubber sundries (Pounds)	427	217	1,490	1,717	1,278	1,442
Automobile tires .....(Number)	73	672	9,250	132,098	2,522	30,191
Other tires .....(Number)	9	35	808	8,083	511	7,813
Belting, hose, and packing (Pounds)	9,053	4,847	20,884	7,969	6,576	2,517
Other rubber manufactures (Pounds)	1,596	1,027	21,469	22,703	18,599	10,102
Coated and Waterproofed goods .....(Pounds)	7,104	4,392	.....	.....	3,103	2,038

AMERICAN CONCERNS GET SHARE OF CHILE'S TRADE

American concerns exporting rubber goods to Chile get about 55 per cent of the business there. According to the reports of the Rubber Division, Department of Commerce, Chile imports from the United States goods that totaled $393,194 in 1922, against $299,939 in 1921 and $1,572,766 in 1918.

There are practically no rubber factories in Chile, this fact accounting for the low tonnage of crude rubber imported. On an average Chile imports about 20 to 25 tons of crude rubber a year.

Merchants there, however, imported $199,687 in tires in 1922 from the United States, against $113,071 in 1921 and $994,911 in 1918. The ratio of imports from the United States to total Chilean tire imports are 65 per cent in 1921, 86 per cent in 1920, 92 per cent in 1919, 89 per cent in 1918. France and England secured about 21 per cent of the tire business there, England getting about 13 per cent of the 21 per cent. During the past four months of 1923 there have been large purchases of tires in Chile which have exceeded all expectations, although during the past few weeks sales have fallen off somewhat.

Although imports in the mechanical rubber goods line fell off during 1920 and 1921, they, however, showed an increase of $148,841 during 1922. As a matter of fact American made rubber hose is very popular in Chile, the country consuming 163,583 kilos in 1921, of which 97,086 kilos came from the United States. Rubber packing is imported from America and England, importers taking 8,784 kilos from this country in 1921 and 10,649 kilos from Great Britain.

The market for rubber footwear is comparatively small, as the dry climate of northern Chile is not conductive to the use of rubber footwear, while southern Chile, which has a heavy rain fall, is sparsely populated.

Ajax to Build in Sandusky

Statement has been issued by the Ajax Rubber Company that it will build on its property at Sandusky, Ohio. Stockholders sometime ago approved the acts of the directors and officers in securing the site there.

Trump to Incorporate

The Trump Rubber Co. of Akron, Ohio, plans to incorporate shortly. E. H. and R. M. Trump are now operating the plant on a partnership basis. The company manufactures 30 x 3½ tires, rubber belting and running board mats. At present the plant is operating on three 8-hour shifts, employing about 90 men.

Master Operating Again

The Master Tire and Rubber Co., located at Dayton, Ohio, has recently resumed production, its plants having been closed down since March 1. The company manufactures a full line of fabric and cord tires.

TIRE ADJUSTMENT PLAN EVOLVED FOR DEALERS

Service Managers' Committee Devises Plan to Overcome Tire Adjustment Evil—Claim Forms for Owner and Dealer Simplify Adjustment Claims.

At a recent meeting, the Tire Executive Committee of the Rubber Association approved a plan developed by the Service Managers' Committee for use in connection with adjustments which are handled through the dealer. The plan is intended for use only when a dealer who does not have the adjustment privilege receives a claim for adjustment. A separate procedure is being developed for use when adjustments are made by dealers or distributors who have the adjustment privilege.

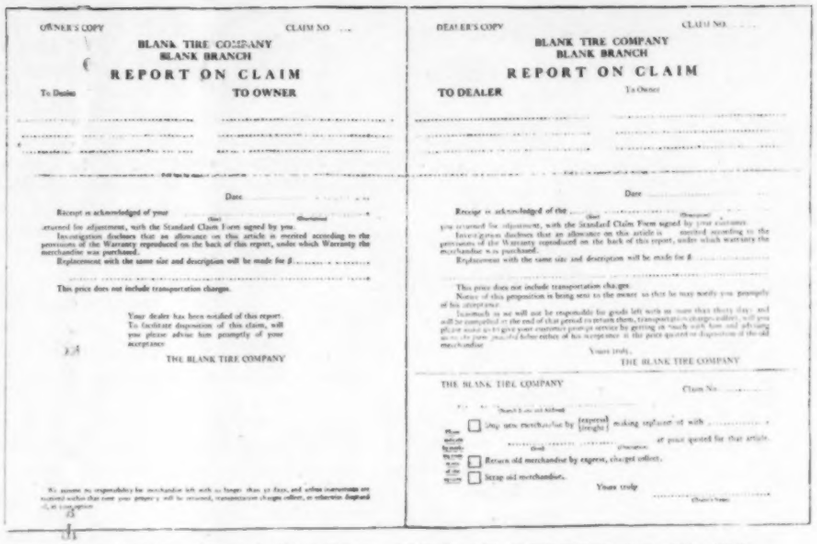
The plan involves the use of a "Report on Claim" which is virtually a statement of the manufacturer's decision regarding the extent to which the tire owner is entitled to an adjustment. By the use of two printed forms—one for the dealer and one for the owner—the dealer and owner are simultaneously informed of the terms upon which a replacement will be made and the tire owner is asked to inform the dealer of his acceptance, which is relayed by the dealer to the manufacturer who completes the transaction by putting through the replacement.

The principal purposes of the "Report on Claim" are: first, to insure, so far as possible, fair treatment of the consumer; second, to impress him with the fact that it is the manufacturer who is making the adjustment for him; and third, to indicate that the transaction is being handled in a business-like way, strictly upon the merits of the consumer's claim in relation to the provisions of the Standard Tire Warranty.

The use of the plan represented by the forms is to be standard practice hereafter by the companies represented on the Tire Executive Committee, and it is believed that all members of the Tire Manufacturers' Division who are supporting the Standard Tire Warranty, will adopt the "Report on Claim," as an auxiliary to their other efforts in connection with the Warranty.

The following important facts are given so that there may be little misunderstanding and confusion in the inauguration of the procedure connected with the "Report on Claim":

1. The plan contemplates the preparation of the report to the dealer and to the owner *at the same time*, through the use of carbon paper or otherwise. The forms have been so prepared that carbon copies may be made and also so that an outlook envelope may be used for mailing if desired. The reports should be mailed to the owner and to the dealer at the same time.
2. An extra owner or dealer form, a blank sheet of paper or an "office copy" form specially devised by each manufacturer, may be used to secure a carbon copy for the manufacturer's files.
3. The word "not" is to be inserted after "is" in the second paragraph of the dealer's form *if an adjustment is not* merited. That form then is to go to the dealer but it is thought that many companies will not wish to use the owner's form unless an adjustment *is* merited. In other words—when no allowance is to be made the dealer's form is probably the only one many companies will consider necessary.
4. The plan contemplates standardization of color, size and text of the form, just as is now the practice with respect to the Standard Claim Form. The sheet is to be 8½ x 11"; the color is to be that which is known as "Goldenrod;" and the text is to be identical with that of the sample forms a copy of which are reproduced on this page.


OWNER'S COPY

BLANK TIRE COMPANY
BLANK BRANCH
REPORT ON CLAIM
TO OWNER

DEALER'S COPY

BLANK TIRE COMPANY
BLANK BRANCH
REPORT ON CLAIM
TO DEALER

OWNER'S AND DEALER'S COPY OF REPORT ON CLAIM

Attention is directed to the fact that the Standard Tire Warranty should be reproduced on the back of the form, as is indicated by reference to it in the second paragraph of the body of the letter on the face of the form.

It is intended that the "Report on Claim" shall be used not only in connection with the out-of-town dealer who ships the tire in instead of bringing it himself to the branch or distributor, but also in connection with the local dealer who presents the tire and with whom a replacement agreement is reached over the counter.

It should be noted also that the form does not provide for any offer to comply with the Warranty by making a repair instead of a replacement. Reference to repairs was purposely omitted because no satisfactory provision could be made in the form for dealing with claims involving repairs, and most companies would prefer to handle each such case individually, with a letter, on the basis of the particular conditions surrounding the claim.

Oak Has Unique Balloon

A line of toy rubber balloons containing pure gum rubber with gold and silver bronzes, is now being offered to the trade by The Oak Rubber Company, Ravenna, Ohio. The balloons are being manufactured in both round and airship shapes, and are claimed to have a unique appeal. When inflated they have a beauty of appearance in their rich, metallic lustre, while another interesting feature is the fact that printed designs show up well upon these ballons, and when imprinted with trade marks and other designs they are particularly impressive.

NEW PROCESSES DESCRIPTION SENT TO U. S. STOCKHOLDERS

In a circular sent to stockholders, the U. S. Rubber Company on April 23 made a brief announcement and gave a short description of the three recent advances in rubber manufacturing processes which the company has developed, as follows: Sprayed rubber for use in the manufacture of all rubber products; Web Cord, a fundamental improvement in cord making and the Flat Steel Drum method of building cord tires. A description of these new processes have appeared in previous issues of THE RUBBER AGE.

The statement in addition to brief descriptions of the new processes says: "It is believed that these three developments mean more to the rubber manufacturer and the user of rubber products of all kinds than anything that has been accomplished in the rubber industry since vulcanization was discovered in 1839 and that they represent a real public achievement."

Material Handling Pamphlet Issued

A safe practices pamphlet, "Handling Material", has just been issued by the National Safety Council of Chicago. According to state reports, handling material by hand has caused more accidents than machinery. With that in view the pamphlet is divided into the following divisions; Power Trucks, Hand Trucks, Piling Material, Handling by Hand and Safe Habits of Work. Each division is subdivided into paragraphs dealing with the different types of equipment used and the different methods employed in handling various types of material. The experience of many members of the council was contributed in preparing the pamphlet, while the assistance of seventy-five safety engineers was employed in editing and revising the material.

RUBBER ASSOCIATION ACTIVE DURING APRIL

Numerous Important Committee and Division Meetings Held—Standard Specifications Being Considered by Railroads—Pamphlet on Tire Abuses Ready.

The month of April has been a very busy one for The Rubber Association of America, if only from the standpoint of the number of meetings held by the several groups of which it is composed. The following meetings were held: The Specification Committee and the Executive Committee of the Mechanical Rubber Goods Manufacturers Division; the Hard Rubber Division; the Service Managers Committee; the Executive Committee and the Tire Specification Committe of the Tire Manufacturers Division; the Rubber Sundries Manufacturers Division; the Automobile Fabric Manufacturers Division; the Traffic Committee; the Accounting Committee and the Board of Directors.

* * *

The Specification Committee—Mechanical Rubber Goods Manufacturers Division of the Association held a very interesting and profitable meeting on April 2. For the past two years or so, the Committee has been collaborating with a Committee representing the American Railroad Association in the formulation of "recommended practice" specifications for various types of railroad hose and one for axle light belting. At a recent meeting held in Pittsburgh, the Committee on Specifications and Tests for Materials of the A.R.A. accepted the proposed specifications, with minor exceptions, and decided to present them to the entire membership of that Association as "recommended practice." The Specification Committee of the Rubber Association is optimistic enough to believe that the tentative specifications will be adopted, at least so far as their major requirements are concerned, by practically all of the important railroads of the country, which will mean a great deal to hose and belting manufacturers, as at the present time each railroad has separate and distinct specifications, causing endless and unnecessary trouble to the manufacturers in meeting multitudinous different, stringent, unreasonable and often "freak" requirements. The Specification Committee also completed consideration, at the meeting, of the Proposed Standard A.R.A. Specifications for Packings, which, it is believed, will also be approved by the American Railroad Association's Committee having the matter in charge.

* * *

The exchange of credit information on customers, the standardization of battery jars and containers, and the compilation of monthly statistics concerning the production of battery jars and containers, were the subjects of major importance discussed at the meetings of the Hard Rubber Division of the Association held at the Yale Club, New York, on April 4.

A two-day meeting of the Service Managers' Committee of the Tire Manufacturers' Division was held in Cleveland on April 5 and 6. The Committee gave further consideration to the pamphlet on "The Care of Pneumatic Tires" and made several changes therein, including the addition of a list of the members of the Tire Manufacturers' Division which is expected to add prestige to the pamphlet and to indicate that a very substantial portion of the tire manufacturing industry is sponsoring that educational work.

In connection with the pamphlet the Tire Executive Committee has approved the following plan: The Association shall arrange the printing of the issue; it shall distribute five copies to the 125,000 tire dealers with a letter explaining the pamphlet's purpose and how additional copies may be acquired; each member of the Tire Manufacturers' Division shall be urged to purchase large quantities of the pamphlets at actual cost of printing and delivery to be distributed to his dealers, and to those concerns who supply ordinary equipment to automobile and truck manufacturers for inclusion by them with the instruction book and tool kit in new cars.

Other plans for distribution were considered but rejected. The above plan is considered absolutely necessary in order that supplies of the pamphlet may be placed intelligently and without waste in some proper relation to the amount of the dealer's or distributor's business, of which the Association has no knowledge.

* * *

A step in the right direction was the convening of a conference of rubber sundries manufacturers, including glove, balloon, sheet-goods, bathing caps and slippers and rubber band makers, under the auspices of the Rubber Sundries Manufacturers Division of the Association in New York on April 6, members and non-members of the Association being present. The statement was made that the Rubber Sundries Manufacturers' Division, because of the diversified lines represented therein and the fact that important factors in those lines are not members, has not accomplished as much in bringing about the adoption of sound business principles and in the correction of dangerous trade abuses in the trades named as it might have, had there been a complete representation and active support of manufacturers. The consensus of opinion of the conference was that it is only by joint action on the part of producers of those lines that desirable conditions can be brought about and all present endorsed the proposal of the Sundries Division to segregate its members into sections, such as the Glove Section, Bathing Cap Section, Balloon Section, etc., which would be composed of all members of the Division engaged in those trades. Altogether the meeting was a very satisfactory one and it is believed, will be productive of good results. On the evening of the same day, in conjunction with the conference, an informal dinner was held at the Yale

(Continued on Page 93)

ANALYSIS OF TIRE PRODUCTION STATISTICS

The following information concerning tire production in 1922 *is* based wholly upon the statistics compiled by the Rubber Association of America.

The figure representing consumption of crude rubber for all tire production was arrived at by multiplying the total number of casings produced by the average consumption per casing, obtained from the tire production reports. The same process was followed with respect to tubes. In connection with the consumption of crude rubber for solid tires, it was necessary to use the consumption data contained in the semi-annual questionnaires as we have no reliable data regarding the average consumption of crude rubber per solid tire.

The total crude rubber consumption arrived at by this method checks so nearly with the total crude rubber consumption for tires and tubes contained in the semi-annual questionnaires that we believe the information subjoined below to be reasonably accurate; also that it is the most reliable data that can be obtained regarding tire production and crude rubber consumption.

The figure representing consumption of fabric for casings was secured by multiplying 100% of casing production by a unit which we believe represents the average consumption of fabric per casing.

Tire Casings Produced:
Actually reported to Rubber Association 30,698,139
estimated to be 75% of whole
100% equals 40,930,852

Inner Tubes Produced:
Actually reported to Rubber Association 38,137,435
estimated to be 75% of whole
100% equals 50,849,912

Solid Tires Produced:
Actually reported to Rubber Association 786,603
estimated to be 90% of whole
100% equals 874,003

Crude Rubber Consumed in all Tire Production — Casings, Tubes and Solids—Estimated—lbs. 523,526,219

Fabrics Consumed in Casing Production—Estimated—lbs. 178,049,206

Slater in Miller Sales Department

William J. Slater, well known in the tire and rubber machinery industry, has recently joined the sales department of the Miller Rubber Co., in an executive capacity. Until recently Mr. Slater was Secretary and Assistant Treasurer of the Williams Foundry and Machine Co., Akron, where he also had charge of Sales and Advertising.

For a number of years Mr. Slater had been previously connected with the Firestone Tire and Rubber Co. in the sales and advertising department.

Goodyear Net is $4,778,200

For the first quarter of the current year the Goodyear Tire & Rubber Co. showed net profits after fixed charges, taxes and interest of $4,778,200. Gross earnings totaled $6,110,800. The balance sheet, as of March 31, showed current assets of $60,078,700 and current liabilities of $8,022,400. Cash and U. S. Treasury certificates were placed at $8,461,500.

HUDSON TIRE STARTS OPERATION IN YONKERS

More than 300 persons gathered in the power plant of the Hudson Tire and Rubber Corporation at Yonkers, N. Y., on April 28, and witnessed Mayor Walter M. Taussig of Yonkers turn on the switch that formerly started production. The company's main plant is 200 feet by 110 feet and is two stories high. The power plant is 60 feet by 75 feet; both plants having been erected at a cost of $650,000.

The plant, vice-president Harry B. Seymour claims, has a capacity of 500 tires a day on an 8-hour shift, and the company will employ about 350 men. The company claims that it already has $670,000 in orders on its books. Officials of the Hudson Tire and Rubber Corporation state that they do not intend to solicit agency or dealer accounts, but are selling their product direct to the manufacturer. Willys-Overland is said to have placed a large order with the Yonkers concern. About September 1 the company states that it plans to erect two additional stories on its main plant.

Among those who witnessed the formal opening were: W. M. Doucette, president of the company; Harry B. Seymour, vice-president; John J. Quinn, secretary; R. H. Crumlich, engineer; Walter B. J. Mitchell, corporation counsel, City of Yonkers; James A. Garrity, past president of the Rotary Club, Yonkers; M. J. Walsh, former Mayor of Yonkers; Charles W. Boote, City Judge, and Judge Morris L. Rossenwasser.

Amazon Sued by Marlboro

The Marlboro Cotton Mills Company of South Carolina is suing the Amazon Rubber Co. of East Akron, Ohio for breach of contract upon the purchase of 90,000 pounds of cotton fabric, alleged to have been contracted for in 1920. The cotton company's petition states that the rubber company agreed to purchase a given amount of cotton fabric, deliveries to be made in monthly installments beginning in June 1920. Purchase price was put at $1.28 a pound, but in February, 1923, the petition avers, Amazon repudiated the contract when cotton dropped to 70 cents a pound. Marlboro asks for a judgement of $16,913.

The rubber company states that the cotton mill failed to send the amount of cotton agreed upon each month, thereby embarrassing the rubber concern in the pursuit of its business. The case is being tried before Judge Ahern, court of common pleas, Akron.

A.S.T.M. To Hold Convention

The twenty-sixth annual meeting of the American Society for Testing Materials will be held at Atlantic City, N. J., during the week of June 25. Officials state that thirteen sessions will be held, and such subjects as Rubber products which covers specifications for wrapped cold water hose and rubber matting for use around electrical apparatus and methods for determination of resistance to abrasion of rubber compounds, steel rails and accessories, automobile steels, timber and timber preservatives, road materials, waterproofing materials, etc., will be discussed. During the past year the society's membership has steadily grown, and the organization has a membership now of over 3,100, the number being distributed throughout the United States and Canada.

R.G.A. COUNCIL MAKES REPORT TO MEMBERS

The Rubber Growers Association of Great Britain held a general meeting in London on April 17. The association reports a total membership of 917, consisting of 534 companies and 383 individuals. It was also brought out that the members own a total acreage of 2,561,842 acres, of which 1,202,018 acres are planted or interplanted with rubber.

During the meeting the fourteenth report of the Council was read. This report brought out some interesting facts showing that the Netherlands Indies, British producers, representing 230,000 acres or 85 per cent of the British interests concerned, have voluntarily agreed to restrict their exports in conformity with the Stevenson scheme. It, furthermore, showed that in British North Borneo the planters have voluntarily adopted the restriction policy, this plan becoming effective January 1, 1922 and being based on a 75 per cent basis of the output of the "standard year." The restriction in Borneo will remain at 75 per cent until the percentage of restriction in force in Malaya and Ceylon has reached that figure and thereafter will advance pro rata with those countries.

The council's report showed that companies operating in Burma were also invited to join a scheme for voluntary restriction of rubber exports. A standing committee, it was brought out, has been appointed to investigate and report to the council upon questions arising out of or in relation to the restriction of export of rubber from Ceylon and Malaya.

The Ceylon Rubber Research Committee reported that the technical staff in Ceylon was completed during the year, while considerable attention was given to the question regarding the methods of testing rubber. Papers on the "Coefficient of Vulcanization and the Amount of Resin in Rubber" and "Effect of the Addition of Organic Accelerators on the variability of Rubber," written by G. Martin, F. L. Elliott and W .S. Davey, were included in the report. Attention was also given to the methods of testing rubber and a revised scheme has been adopted for use by the Imperial Institute.

The Freights Committee continued to press for reductions in freight rates on rubber from the East to the United Kingdom. A concession was obtained in July, but in February, 1923, the rate was increased by $1.20 a ton, the new rate being about $13 a ton from Colombo to London and Liverpool and Straits to Liverpool, and $12.96 a ton from the Straits to India. This compares with the rate of $15 60 per ton in 1913-1914.

COTTON SUBSTITUTE BEING SOUGHT BY THE GERMANS

A recent press dispatch from Berlin states that research work designed to develop a substitute for cotton has been taken up again by German textile scientists. It is expected that ways and means may be found of making Germany's textile industry independent of foreign markets by the perfection of a new process of "cottonizing" various other fibers.

Before the war, Germany's requirements for raw materials were about 860,000 tons a year, consisting chiefly of cotton, wool, jute, hemp and flax. Twenty thousand tons, or scarcely 3 per cent, were actually produced within the country. Nearly half of Germany's bill to outside countries for raw products for the textile mills went for cotton alone.

A special bureau of the Emperor William Institute for the Furtherance of Science has been established in connection with the textile fiber research work, and the professors claim that attempts to "cottonize" some fibers, such as hemp, flax and jute, by mixing them with cotton, have yielded very satisfactory results. The professors contend further that probably a way will be found of utilizing refuse fiber from the fabrication of flax, hemp and jute, and turning this into high-grade yarns by means of the new processes now in the course of development.

While Germany's climate is not suitable for the cultivation of adequate quantities of cotton, since the war the supply of sheep wool has shown an increase, and special efforts have been made by the government to develop the growth of flax, hemp and jute. Most of the cotton bought now by Germany comes from the United States.

General's Production Up

Plants of the General Tire and Rubber Company are turning out about 4,000 tires a day, this being an increase of 1,500 tires a day, compared with the company's production six months ago. This increase follows operation in the new addition to the company's plant in Akron, which was built to double tire production. The company is operating only a single shift.

Schwartz Sails for England

W. D. Schwartz of the L. H. Butcher Company, New York City and San Francisco, accompanied by Mrs. Schwartz, sailed on the steamship Majestic, April 21, for England and the Continent. Mr. Schwartz plans to visit the company's principal factories in nine countries before returning to America.

New Corrugated Directors

George D. Campbell, William J. Beardsley and Arthur P. West, vice-president of the National Surety Co., have been elected directors of the Corrugated Rubber Company which is completing its plant at Poughkeepsie, N. Y.

CACTUS IN JAMAICA FOUND TO BE RUBBER PRODUCER

In the *Riverside Press* (Cal.) of April 11, there appears the following news item on a newly discovered cactus which is reported to be a rubber producer:

Rubber of a superior quality can now be produced in the United States. Such is the assertion of Emilio Cassi, an Italian agriculturist, resident in Havana, Cuba, who claims to have made a discovery which may revolutionize the rubber industry. Signor Cassi declares that he has discovered a new rubber producing plant which will grow readily in any soil and in any climate.

This plant belongs to the cactus family and is known to science as the Polonus-Cider (Benth). It is a native of the island of Jamaica. Like other cacti of the species, it grows in the form of attached, oblong sections, dark green in color and covered with spines and attains a height of about 20 feet.

A slip of this cactus, planted in any soil, grows in three months to a height of nearly four feet, and can then be tapped. The juice flows freely and in density and color might easil be mistaken for the juice from which rubber is produced. When placed in a glass vessel and subjected to heat by steaming, it thickens until it assumes the gummy consistency of crude rubber. Removed from the vessel, this gum presents all the characteristics of the best quality of caoutchouc, or India rubber.

Signor Cassi says that this rubber can be vulcanized and can be employed for all of the industrial purposes for which India rubber is used. The great advantage of this plant lies in its adaptability to any soil since, although a cactus, experiments have shown that it will grow equally well in marshy, heavy, light or sandy soil.

Another point in its favor is the rapidity of its growth, since in three months after planting it attains a size which will permit of tapping. The grower, therefore, would not have to wait for a period of years before reaping the benefit of his efforts, as so often happens in other branches of agriculture. Moreover, he would obtain results with a minimum of labor, since the cactus, once planted, would require only the necesary care to prevent the plants being damaged by extraneous causes.

In one year's time the plants reach a size of eight feet high by three feet in diameter. From a plant of this size Signor Cassi says, some two gallons of juice could be extracted without injury to the plant and from this quantity of juice, he claims, about ten pounds of pure rubber can be produced.

Ott Rubber Purchases Land

Negotiations between Ott Rubber Company of Dubuque, Iowa and the city authorities for the purchase from the city of 2.8 acres of land on the site of Rafferty's slough have been completed. The city council at a special meeting recently passed on first reading a resolution selling the land on the corner of Railroad avenue and Salina street to the firm.

The amount of the transaction was $10,500. The Ott Rubber Company, recently organized in Dubuque, is expected to begin work in the near future in the erection of a plant on this site for the manufacture of inner tubes.

New Chemical Concern in West

The West Coast Chemical Corporation will establish a plant at Clyde, California for the production of antimony sulphuret. F. A. Somers, president of the corporation is also president of the Merchants Exchange of San Francisco and a director of the American National Bank. Directors are: H. R. Bostwick, Dixwell Hewitt, L. M. Hoefler and H. C. Adams, all of San Francisco. Henry P. Adams, operating manager, has charge of the construction and equipment of the plant. The general offices of the company are in the Hobart Building, San Francisco.

New Williams Tire

The "Williams Cord," is the latest addition to Akron's tire family. It is made by the Williams Tire Co. The tire has a "W" design on the tread, designed at a 45 degree angle to prevent sliding.

BRITISH PRESS CAMPAIGN AGAINST IMPORTING TIRES

Tire imports into the United Kingdom in 1922 were valued at £4,241,847. The propaganda subcommittee of the British Rubber Tire Manufacturers Association have opened a campaign to show British motorists that by buying imported tires they are injuring the English rubber and cotton industries, while by purchasing manufactured tires in Great Britain, alleged to be now fully equal in quality to imported makes, they would reduce unemployment. Recent issues of trade and leading newspapers have devoted considerable space to the arguments presented by the propaganda subcommittee. There has also been considerable discussion of a proposal to subject tire imports to the 33⅓ per cent tariff applicable to motor vehicles.

Knox Tire Changes Name

The Knox Tire and Rubber Company's name has been changed to the Mt. Vernon Rubber Co. This decision was recently arrived at by a committee of stockholders who were reorganizing the old company. W. M. Perkins of Marion, Ohio, has been elected president of the new company; P. Robert Berg of Cleveland, vice-president; John P. Robson of Barton, second vice-president; W. E. Johnson of Lexington, Ky., treasurer; George H. Jones of Mt. Vernon, secretary, and E. G. Lloyd of Columbus, general counsel.

Manhasset to Move to Conn.

Because Connecticut is a fifty-four hour-a-week state and because lower production costs prevail there, the Manhasset Manufacturing Company, producers of tire fabrics, will close its plant at Taunton, R. I., and will move to Putnam, Conn. While arrangements for the removal have been completed, the project has been temporarily held up until housing accommodations can be arranged for its 200 employes. The company, however, will continue to operate its plants at Warren, R. I., for a forty-eight hour law was recently defeated in the Rhode Island Legislature.

Report of Inventory—Production—Domestic Shipments of Pneumatic Casings—Inner Tubes—Solid Tires

December, 1921 to February, 1923.

"Production" and Shipment" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.
"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.
"Shipments" includes only stock forwarded to a *purchaser* and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

(Compiled by The Rubber Association of America, Inc.)

	PNEUMATIC CASINGS				INNER TUBES				SOLID TIRES			
MONTH	No. Mfrs. Reporting	Inventory	Production	Shipments	No. Mfrs. Reporting	Inventory	Production	Shipments	No. Mfrs. Reporting	Inventory	Production	Shipments
December, 1921	64	3,696,519	1,839,738	1,980,264	64	4,731,021	2,070,098	2,522,710	10	168,515	40,478	39,520
January, 1922	66	4,174,216	2,055,134	1,596,806	66	5,246,647	2,343,393	1,889,724	11	181,769	40,224	33,294
February, 1922	66	4,691,329	2,084,308	1,562,365	65	6,141,956	2,596,774	1,702,583	11	183,448	39,492	36,805
March, 1922	63	5,183,286	2,645,790	2,073,963	63	6,991,118	3,017,511	2,090,737	11	182,197	49,433	48,350
April, 1922	65	5,464,336	2,401,187	2,086,651	65	7,230,096	2,650,573	2,329,343	11	173,748	46,664	52,309
May, 1922	65	5,523,095	2,721,503	2,639,273	65	7,189,552	2,970,696	2,938,947	11	170,904	57,640	60,711
June, 1922	64	5,042,147	2,838,890	3,133,260	64	6,186,534	3,130,629	3,973,679	11	169,808	66,089	63,408
July, 1922	63	4,834,106	2,476,636	2,695,095	63	5,675,839	3,068,199	3,630,744	11	176,375	71,505	60,425
August, 1922	63	4,629,392	2,905,209	3,029,823	63	5,207,228	3,808,224	4,220,055	11	189,698	84,313	69,435
September, 1922	64	4,612,037	2,504,744	2,502,106	64	5,164,757	3,501,442	3,558,971	11	200,016	82,767	66,797
October, 1922	64	4,682,958	2,674,662	2,588,770	64	5,488,033	3,787,758	3,420,680	11	213,942	85,480	71,275
November, 1922	62	4,964,976	2,733,134	2,379,708	61	6,210,053	3,850,908	3,075,023	11	234,684	85,775	61,466
December, 1922	59	4,599,208	2,656,942	2,934,079	59	5,732,125	3,411,074	3,825,949	10	244,061	77,221	64,570
January, 1923	62	4,695,916	3,127,270	2,994,297	62	5,838,310	3,951,885	3,748,651	11	262,462	83,383	60,611
February, 1923	60	5,224,387	3,217,987	2,588,639	60	6,771,958	4,039,202	3,001,697	11	270,191	75,457	63,394

RUBBER ASSOCIATION ACTIVE DURING APRIL

(Continued from Page 92)

Club in which both members and non-members took part. The occasion was particularly fitting at that time as it commemorated the Twenty-Fifth Anniversary of the founding of the original Rubber Sundries Manufacturers' Association which was later taken over by the Rubber Club of America.

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On April 9 the Automobile Fabric Manufacturers' Division held a very interesting meeting at the Yale Club, New York, at which subjects of a nature intimate to that trade, were discussed, including the formulation of uniform order and acknowledgment forms.

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The Traffic Committee of the Association met on April 10 and prepared for its appearance before the Official Classification Committee on the following day, the rate-making body for eastern railroads, relative to its proposals for reductions in the carload rates on rubber soles and heels and on solid tires. The Traffic Committee also discussed questions relating to tire-wrapping and its proposal to have scrap rubber rates applied to used tires returned to factories.

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The Accounting Committee met in the Association office on April 11 and discussed details connected with the employment of professional assistance for that Committee in the formulation of uniform cost accounting fundamentals for rubber manufacturers. This work will be conducted by the Accounting Committee with the assistance of a cost accounting man who will be added to the staff of the Rubber Association office.

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On April 19 the quarterly meeting of the Executive Committee—Mechanical Rubber Goods Manufacturers' Division—was held at the Yale Club. A number of matters relating to that trade were considered by the Committee.

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The Tire Specification Committee, which is composed of technical representatives of a number of members of the Tire Manufacturers' Division, again met with representatives of the Government's Bureau of Standards in the Association office on April 20, and discussed in detail with those representatives, the Committee's proposals as to the substitution of certain physical tests in place of detailed chemical and construction requirements in the Bureau's specifications for casings, inner tubes and solid tires.

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The regular quarterly meeting of the Tire Manufacturers' Division, which was scheduled to be held on April 25, was postponed, as a number of the subjects which were to have been discussed were not in shape for presentation at that time. The Executive Committee—Tire Manufacturers' Division, met on that day, however, and considered several matters of a routine nature.

The regular monthly meeting of the Board of Directors of the Association was held at the Lotos Club on April 26. The questions considered by the Board were also of a routine nature, relating to the functions of the Association.

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Several Divisions of the Association have expressed their endorsement of the suggestion that the Association compile a list of the trade names, trade marks and designs used by its manufacturing members, irrespective of the line of rubber goods produced by them. The proposal also contemplates the issuance of supplements to the list periodically, in order that all members of the Association might be kept advised of changes therein.

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The responses to the Association's 1923 questionnaire—first quarter, promise to exceed in number even those received under the semi-yearly questionnaires for 1922, both of which established new high records. The issuance of the questionnaire quarterly is a new undertaking for the Association, it having previously been confined to six months periods. It will be recalled that it calls for information from each manufacturer as to his average daily number of employes as of a certain week in the period covered by the questionnaire, his consumption of crude rubber in the different articles manufactured by him and the sales value of those articles. A very important part of the questionnaire is that calling for information as to stocks of crude rubber on hand as of March 31.

RAG RUGS OF RUBBER ANNOUNCED BY GOODRICH

The B. F. Goodrich Company has just introduced a "rag" rug of rubber which is particularly adaptable for service in bath rooms, shower baths in gymnasiums, porches, bed rooms, kitchens and in sea side cottages. The rug is made of a white rubber compound body with colored stripes. Another design comes with red, green or blue ground and white stripes. The colored stripes are cured on, and the company claims that the colors will not fade regardless of the frequency with which it is cleaned.

According to the tests that have been made these rugs should wear for a long time. The rug, furthermore, will lie flat on the floor free from wrinkles. It is easy to keep clean, and for that reason, it is claimed, is more adaptable to various household uses than the rug of cloth. At present a number of large department stores are exhibiting these rugs, among them being the Wanamaker stores. Other buyers have been owners of large summer hotels.

Kling Gets New Post

Ernest F. Kling has recently become affiliated with the Canada Star Rubber Co. He is now factory manager of the Star's plants on Bathhurst Street, Toronto, Canada. Mr. Kling was formerly the general manager of the Batavia Rubber Co., Batavia, New York.

WHITFORD AND FEIKER GET HOOVER APPOINTMENTS

Harry W. Whitford and F. M. Feiker have been appointed by Secretary Hoover to investigate the sources of crude rubber and the development of rubber plantations in the Philippines. These appointments are made in accordance with the recent appropriation of $500,000 for that purpose by Congress.

Professor Whitford will head the probe, while Mr. Feiker will be one of his assistants. In the fore-part of President Harding's administration Mr. Feiker was an assistant to Secretary Hoover. Until his appointment Mr. Feiker was the assistant to the president of the McGraw-Hill Co.

On the other hand Professor Whitford is a man who has had a great deal of experience in tropical forestry, he having at one time headed the Bureau of Forestry in the Philippines. He has also traveled extensively throughout Central and South America. For the past six years Professor Whitford has been connected with the division of tropical forestry at Yale University.

Part of Professor Whitford's work will be to study the growth of rubber plants on American soil, and the Department of Agriculture is planning to import a number of Chinese rubber plants and Guayule, another rubber producer. This part of the work will be conducted in laboratories at San Diego, California. In a communication received from Mr. Whitford he states that the Rubber Division is preparing an announcement regarding the object and scope of the survey.

Keystone Lost $474,916 in 1922

The Keystone Tire and Rubber Company for 1922 reports an operating loss of $474,916 after payment of operating expenses and other charges. This compares with an operating loss of $575,664 in 1921. After crediting other income and allowing for interest, taxes and other fixed charges, the company reported a net deficit of $890,306, against $679.039 in 1921. The profit and loss deficit on Dec. 31, 1922, as shown in the report, amounted to $2,538,578, against $1,468,128 at the end of 1921.

Tracy Resigns from Paul

Richard B. Tracy has resigned as sales and advertising manager of the Paul Rubber Company, Salesbury, N. C. For a number of years Mr. Tracy was the sales manager of the Globe Rubber Co., Trenton, N. J., and prior to that he was connected for sixteen years with the Michelin Tire Co., having charge of the Ohio and West Virginia territory for that company.

New Goodrich Shoe Plant

A new building is being added to the B. F. Goodrich's boot and shoe plant at Akron, Ohio. The new plant will cost approximately $20,000, and will contain a number of up-to-date machines.

Meeting of Rubber Section of A.C.S.

Spring Meeting Held in New Haven—Numerous Valuable Papers Read — Prof. Bruni Attends

A NUMBER of interesting papers were read at the meetings of the Rubber Section at the Sixty-fifth meeting of the American Chemical Society, held at Yale University, New Haven, Conn., during the first week of April. The meetings held on April 5 and 6 were of particular interest to rubber technologists.

Following the rubber chemists dinner, held on the evening of April 5, the personages of noted rubber inventors appeared in living ectoplasm. Charles Goodyear was the first to appear, he being impersonated by Ellwood B. Spear who epitomized Goodyear's life's work. Next, Thomas Harding came upon the scene in the form of Prof. G. S. Whitby who also gave a brief outline of the machine invented by Hancock for massing together pieces of crude rubber by mastication. Jen Van Geun, Thomas Rowley and Christopher were also represented by Winfield Scott, C. W. Bedford and C. Olin North respectively.

The following are brief abstracts of some of the papers read before the rubber division meetings at its sessions on April 5 and 6:

Reactions of Accelerators During Vulcanization VI—Action of Litharge and Organic Acids *By C. W. Bedford and H. A. Winkelmann*

L. E. Weber has shown that an actone extracted rubber will not vulcanize in a mix containing litharge. The same is true of the vulcanization by nitro compounds and litharge without sulphur. In either case organic acids or phenols will replace the natural resins and vulcanization will result.

Acetone extracts of plantation rubbers react with metallic oxides at ordinary temperatures, forming metallic salts soluble in benzene and rubber. Solution of the metallic radical in rubber is one prerequisite for the action of inorganic accelerators.

A Method of Measuring Cure by Compression Tests—*By R. J. Bonstein*

A description of an apparatus capable of being attached to a Scott Testing Machine by means of which a one-inch cube cut from a solid mass of rubber may be compressed.

Data for per cent compression, energy and hysteresis are shown in relation to the time-tensile curves.

A Review of Recent Important Investigations in the Chemistry of Rubber—*By H. L. Fisher*

A review is given of the more important recent investigations on he chemistry of rubber showing the following results obtained:

(1) Substantiation of the C_5H_8 ratio and the C_5H_8 nucleus as the fundamental grouping in the rubber hydrocarbon, and the presence of a double bond for each C_5H_8 nucleus.

(2) Hydrogenation of rubber directly and in solution has been accomplished.

(3) Studies in oxidation have produced new products, especially $(C_5H_8O)_x$.

(4) Viscosity measurements have shown that the change during the heating of a solution of rubber is reversible, provided air is excluded.

(5) Concentrated sulphuric acid on a rubber solution produces what appears to be an isomerized rubber.

Time Vesus Temperature of Vulcanization—*By A. A. Somerville*

About thirty compounds containing different accelerators with varying amounts of sulphur and activators have been cured over a considerable range of time at each of three fixed temperatures also over a varying temperature as in accordance with what under certain conditions might be the actual thermal condition in certain parts of a tire during vulcanization, thereby establishing some relation between rates of vulcanization under different thermal conditions.

This in conjunction with two other laboratories and the advice of about thirty consultants.

The Use of Selenium in Rubber Compounding—*By Ira Williams*

Although Selenium alone will produce but a very poor vulcanization in rubber, mixtures of Sulphur and Selenium may be used with different results. Such stocks are highly colored and vary from light yellow through bright red and finally to dark brown.

Selenium when used with Sulphur produces much faster vulcanization with apparently little or no combination of Selenium. The crystallization of Sulphur in rubber is affected by the presence of Selenium.

In addition the following papers were also read: Examination of the Emulsifying Properties of Some Constituents of Hevea Latex by G. S. Whitby; Note on the Pyrrole Test as Applied to Rubber by G. S. Whitby; Poisson's Ration and Related properties for Compounded Rubber by R. D. Evans and W. W. Vogt; L. S. Rubber, A New Crude Rubber by E. Hopkinson; Studies of Vulcanization Accelerators by G. S. Whitby and H. E. Simmons; Laboratory Burning Tests for Accelerators by S. M. Cadwell and O. H. Smith; Substitution and Addition of Chlorine in the Rubber Molecule by J. McGarvack; Solubility of Sulphur in Rubber, by W. J. Kelly and K. B. Ayers.

During the business meeting three committees were discharged—the Physical Testing, Standardization of Test Formulas and Analytic Committees—and two new committees were appointed in their place. W. W. Vogt of Goodyear was appointed chairman of the Physical Testing Committee, consisting of three members and two corresponding members. T. G. Coffin of the United States Rubber Co. was named chairman of the sub-committee on Apparatus which has only two members. D. F. Cranor of the Lee Tire and Rubber Co. was appointed chairman of the crude rubber testing committee, consisting of four members and five corresponding members.

The rubber division was honored by the presence of Prof. Guiseppi Bruni of the Polytechni of Milan, Italy, who read an interesting paper on "Organic Acceleration of Vulcanization."

Hints in Caring for Rubber Ware

The following is an abstract of an article that appeared in *Glas und Apparate*, No. 14, 1922, in which there were given some useful hints regarding the keeping of rubber goods, particularly the rubber-ware used in the chemical laboratory.

It is recommended that the rubberware be kept wrapped up in paper while not in use, so that the air cannot come in contact with it and the temperature of the air in the room in which the rubber goods are stored be as close as possible to 10 to 12 degrees C. The greatest enemy of rubber is the rays of the sun. In order to fasten rubber tubes to glass and metallic parts, it has been recommended to moisten them first with a little water or glycerine. Both of these substances, however, are not very effective, as in the course of time, the tube becomes so tightly fastened to the glass or metal, that the only possible way of removing it is to cut it off entirely. Much better results are obtained when a little very finely ground talc is added to the glycerine, 2 parts of the glycerine to one part of talc. The mixture is then used as a lubricant for this purpose. After the glycerine has been absorbed or removed in one way or another, the talc remains and acts as a lubricating film between the rubber and the glass.

Employment and Specifications of Pilot Balloons

By George V. Whittle, Lieut. (C.C.) U.S.N.

PILOT balloons are small balloons employed for the purpose of determining the direction and velocity of the wind at various altitudes. They are usually released at certain definite intervals from meteorological stations and from stations or ships to which aircraft are assigned. It is also customary to release pilot balloons a short time before aircraft are sent up so as to furnish the aviator with information regarding the wind aloft.

The following description gives an idea of the method employed in determining the wind conditions a'oft with pilot balloons. The balloon is usually inflated with hydrogen from a flask until certain predetermined "free" lift ((usually expressed in grams) is obtained. For a balloon of a given size, this "free" lift determines the velocity of ascent which is usually expressed as so many meters per second. At definite time intervals, (usually one minute) observations are taken on the balloon by means of one or more theodolites. The theodolite gives the azimuth and elevation angles of the balloon at the end of each time interval.

With this data, and knowing the rate of ascent of the balloon (from the free lift allowed), the position of the balloon relative to the starting point can be calculated with respect to the elapsed time. It is customary to plot the path of the balloon from which the wind direction and velocity at any altitude can be determined, up to the maximum altitude that the balloon was observed.

Pilot balloons are made in various colors. In the Naval Service. three colors, viz: natural gum (tan), black and red, are used. The reason for the various colors is that each one shows up best under certain cloud and visibility conditions. More colors than the above are not necessary as one of these three will be found satisfactory for any condition under which observations can be taken. An experienced observer can be depended upon to select the proper color for any given set of conditions.

In the Naval Service, pilot balloons of the 6 in. and 7½ in. and 9 in. size are used. The nominal diameter of the form upon which the balloon is made is used to designate its size; that is, a 6 in. balloon is made on a form approximately 6 in. in diameter.

Specifications for Pilot Balloons

The following is an extract of the Naval Observatory's specifications for pilot balloons:—

"The balloon shall be made of pure para gum of good quality, without blemish and in general, equal to those now in use in the Naval Air Service. Colored balloons to be of good even color. Dark balloons to be opaque when inflated, pigment not to have a deteriorating effect. A reasonable number of patches covering pin holes or blemishes will be allowed, provided these do not detract from the expansion of the balloon nor increase its weight beyond the allowed limit. To inflate to a shape practically spherical. Appendix to be 2 in. long, and 1¾ in. in diameter.

"Balloons shall be practically uniform as to size and weight, weights deflated and diameters to be in accordance with the following table:—

"Balloons should be capable of being expanded to diameters given without undue strain on material.

Diameter deflated	6 in.	7½ in.	9 in.
Weight limit	26-34 gr.	40-50 gr.	44-56 gr.
Capable of inflation to	28 in	37½ in.	45 in."

Manufacture of Pilot Balloons

The sequence of operations in the manufacture of pilot balloons is as follows: Mixing of Cement, Dipping, Inspection, Rolling of Bead in Appendix, Curing, (outside), Stripping from forms, Curing, ((inside), Tumbling in Ammonia Vapor, Printing (if desired), Air-inflation and Inspection, Packing.

For cement, pure Para gum is mixed with a high grade solvent together with a pigment, if such is desired. The cement is strained through a ninety-mesh wire screen before being placed in the dipping tank. Some manufacturers use cheesecloth, but this does not give as good results as the wire screen, as the mesh in cheesecloth is not uniform.

The Dipping Operation

For the dipping operation, the balloon forms are arranged in a frame in rows. This frame is lowered into the cement slowly by means of an operating mechanism consisting of a rack and pinion with a crank. It is necessary to lower the forms into the mixture slowly or else air-bubbles will form at the tip of the forms. The tendency for air-bubbles to form on the first and second dips is not as great as on subsequent dips. The amount of rubber picked up on each dip is greater than that picked up on the previous dip. That is, more rubber is picked up on the second dip than on the first, and more on the third than on the second. About half an hour is allowed between dips and the number of dips varies with the size of the balloon.

As soon as a dip is made, the forms are withdrawn from the cement and alternately rotated with the top of the form uppermost and then with the top of the form pointing downward. This is done in order to keep the coating of cement uniform over the surface of the balloon—if held in one position the cement would run to the bottom, forming a thick coat, and with a thin coat on top. After the dipping operation is completed, the forms are removed from the machine and sent to an Inspection Room.

The inspection after dipping is for the purpose of throwing out such balloons as are defective without entailing the expense of running them through the successive manufacturing operations and rejecting them at final inspection. Balloons that are rejected at this stage can be salvaged; that is, the material in them can be used over again as they have not been cured. In this inspection, the forms are placed in a Light Cabinet which is illuminated by means of indirect radiation from lamps placed in the top of the cabinet. Indirect radiation is used in order to eliminate shadows. The flaws looked for in this inspection are; air-bubbles at top, dirt or grit in compounds, and imperfections due to flaws in the forms. Such defects can easily be detected at this stage.

After the inspection mentioned above, a bead is rolled in the appendix of the balloon.

Curing in Vapor or By Dipping

The next operation is curing, which may take place either in a Vapor Cabinet or by dipping in an acid bath. In acid curing, the gum-coated balloon forms are dipped into an acid bath, allowed to remain in it for a fraction of a minute and are then withdrawn. Pilot balloons are practically always given two cures, one for the outside and one for the inside, on account of the thickness of the gum coating—toy balloons usually get but one cure. In the case of pilot balloons, the outside may be cured by either acid or vapor, but the inside is always cured by vapor. For the inside cure, the balloons must be stripped from the forms, turned inside out and placed in a Vapor Cabinet. For an outside vapor cure, the cabinet has a number of racks upon which the balloon forms are placed. At the bottom of the cabinet is an open trough or tank in which the curing agent is placed. Sulphur-chloride is usually employed as the curing agent and carbon bi-sulphide as the vehicle. Some plants use an inferior solvent such as benzol instead of carbon bi-sulphide as the vehicle for the sulphur-chloride. Sulphur-chloride itself, is hard to handle

as it picks up moisture and forms hydro-chloric acid. The curing should not take place inside of six hours from the time of the last dip and if high grade solvents are used in the cement, there will be no solvent odor in the balloon six hours after the last dip. Low pressure steam is used for vaporizing the solvent. The time required for curing depends upon the compound used and the intensity of the curing vapor. The best cure can only be determined by experiment.

After the outside curing is completed, the forms are removed from the Vapor Cabinet and the balloons stripped from the forms by hand. The forms are placed at the edge of a box of soap-stone and the person doing the stripping, places his hand in the soapstone and then strips the balloon.

After stripping, the balloons are then given an inside cure as noted above. For this cure, the balloons are placed in a wire mesh drum and rotated in a vapor cabinet—this cure may last half an hour.

After being completely cured or vulcanized, all balloons are deodorized by placing them in a tumbling barrel or drum and rotated in a cabinet containing ammonia vapor. The ammonia vapor not only removes the smell of the curing agents but also neutralizes whatever traces of curing agent that remain and prevent further curing from taking place. The ammonia vapor bath is very important, especially when balloons are to be stored in metal containers or for a long period of time—say several months.

After the ammonia vapor bath, each balloon is inspected to determine whether it complies with the specifications. The balloons are first weighed individually to determine whether they are within the weight limits specified. The balloons that satisfactorily pass the weight requirements are then air-inflated, held before a light and examined for spherical shape and defects consisting of air-bubbles, grit, flaws caused by defective forms, improper curing, etc. The table at which this is done is equipped with an air-line and shut-off cock. The balloon is placed over the cock inflated to the diameter specified and examined. An incandescent lamp placed at the back of the inspection table provides the necessary light. Final acceptance or rejection of the balloons is made at this time.

If it is desired to apply any markings to the balloon, they are applied just prior to the table inspection mentioned above.

If pilot balloons are to be shipped in metal cases, they should be sealed in waxed (moisture excluding) paper before being placed in the metal case. Under no condition shou'd the metal case be soldered to seal it as the heat from soldering will injure the balloons—the case should be sealed with adhesive tape. However, heavy cardboard boxes are believed to be as good and under certain conditions, better than metal cases. If balloons are packed in cardboard boxes they should be sealed in waxed paper, placed in the box and a sealed waxed paper wrapper put around the outside of the box.

Pilot balloons (regardless of how well they are made,) will deteriorate with age—this is a characteristic of all rubber goods and especially so of thin, dipped material. However, this deterioration can be greatly accelerated by improper packing or storage. Sunlight, heat, mildew, stretching and high humidity with heat are enemies of rubber and should be avoided. Balloons that are to be stored should always be packed in tale and kept in a cool, (not freezing) dark, dry place until wanted for use. An effort should be made to keep not more than two or three months supply of balloons on hand and to use all balloons before they are a year old.

Book Reviews

SYNTHETIC RESINS AND THEIR PLASTICS, By Carleton Ellis, published by The Chemical Catalog Co., 541 pages with illustrations

The chemist engaged in research work may well afford to read this book. From the very outset it is evident that the author has done considerable research work, and therefore gives his readers first hand observations regarding synthetic resins having the natural properties, heretofore not found. He also intimates that the demand for synthetic resins will continue to grow as the supply from natural sources is by no means certain.

In the introductory chapter Mr. Ellis defines a synthetic resin as follows: "It is a complex amorphous organic semi-solid or solid material, usually a mixture of substances; built up by a chemical reaction and approximating the natural resins in various physical properties; namely, lustre, fracture, comparative brittleness at ordinary temperatures, insolubility in water and fusibility or plasticity when heated or exposed to heat and pressure but commonly deviating widely from natural resins in chemical constitution and behavior with reagents."

To the rubber chemist the chapter on Commercial Grades of Cumaron Resin, their uses and identification, should be of interest. Enameling, rubber compounding, tar acids, etc., are fully discussed. Chapter 21, on Halogenated Rubber, may also be read to advantage by rubber technologists. In that section the action of the Halogens on rubber, solubility of chlor rubber, composition of chlorinated and brominated rubber, effect of reagents, iodine, hydrogen chloride, are meticulously treated. General properties of chlorinated rubber are also given. For example, the author says that "films made from this highly chlorinated material are more brittle, ordinarily, than those having a low degree of chlorination. Chlor rubber appears to have possibilities in impregnating paper, waterproofing cloth, etc. Highly chlorinated gutta-percha is more brittle than chlor rubber, and the solubility is somewhat greater."

Numerous footnotes give the reader additional sources of information bearing upon the particular subject being discussed. The book is well indexed, and also contains a number of formulas and diagrams.

CONTROLLING THE FINANCES OF A BUSINESS, By James O. McKinsey and Stuart P. Meech. 638 pages. Published by The Ronald Press Co., N. Y. City. Price $5.00

The authors of this volume attack the everyday problems of financial administration in a practical and competent fashion. They deal with the normal operations of a going concern.

One of the features of the book—and a topic which has been neglected somewhat in other works on finance—is the determination of capital requirements and the control of distribution. Under that caption and under the sub-head of Conservation of Working Capital the authors point out three essentials that the financial administration of a business concern should avoid. They are: Borrowing too much working capital; having such a small margin of owned working capital that it cannot borrow enough to meet its needs; neglecting to plan ahead for its loans, in which event the time needed to secure loans may temporarily halt production or the condition of the money market may prevent the securing of all the funds needed.

Other topics discussed are: Sources and Devices for Securing Capital, Marketing Securities, Control of Capital, Disbursements, Control of Credit, Control of Income, Organization for Financial Administration. The book is illustrated with charts and graphs, and is also well indexed.

Domestic Exports of Reclaimed, Scrap and Old Rubber from the United States by Countries, for Month of February, 1923

	Reclaimed		Scrap and Old	
	Pounds	*Dollars*	*Pounds*	*Dollars*
Belgium	....	....	22,256	1,321
Germany	....	....	13,594	816
Spain	....	....	192,797	11,577
Sweden	22,000	2,968	11,207	1,121
England	52,808	3,736	26,518	1,648
Scotland	....	....	16,881	797
Canada				
Maritime Provinces	....	....	424	10
Quebec and Ontario	406,008	37,377	306,318	6,509
Hongkong	....	....	4,260	175
Japan	5,189	463	71,778	436
Total	486,005	44,544	666,033	24,410

The All Purpose Gas Mask

Developed by the Chemical Warfare Service for Peace Time Use in Fighting Smoke, Gas and Vapors in Industries

RADICAL changes in gas masks that will greatly increase their value in war and peace were announced by Brigadier General Amos Alfred Fries, chief of the Chemical Warfare Service, United States Army, at the sixty-fifth meeting of the American Chemical Society at Yale University.

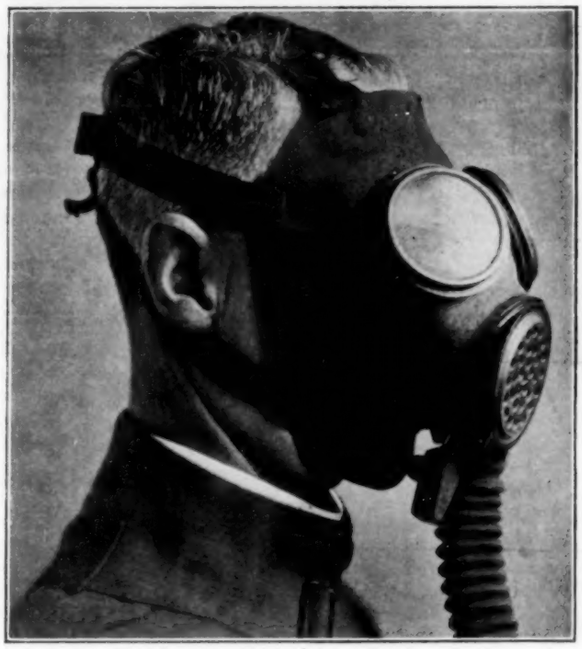
These changes, recently perfected by the Chemical Warfare Service under the direction of General Fries, enable the wearer to talk clearly through the mask without difficulty and do away with the troublesome and uncomfortable nose stopper and mouth tube of the old way.

The new mask not only will add greatly to the comfort of the wearer, but also will enable him to converse or to shout directions which was almost impossible with the mask used during the war. The old standard U. S. Army gas mask gave protection against all the poisonous and irritating gases which were encountered on the battle field in the late war. It did not protect against carbon monoxide and ammonia, two dangerous gases frequently met in the industries and in fire fighting. The desirability of a mask which will protect against all gases, smokes and vapors likely to be met in the industrial work and in fighting is apparent.

As a result the Bureau of Mines recently developed a "Universal" mask, utilizing "Hopcalite," a war time Chemical Warfare Service development for carbon monoxide protection. Later the Chemical Warfare Service produced the "All Purpose Mask" which also uses "Hopcalite." This can be used wherever there is sufficient oxygen in the air to support life. An atmosphere that does not maintain a safety lamp flame must never be entered with a gas mask.

Unlike the heavy oxygen breathing apparatus which it was formerly necessary to use for all around protection, the all purpose mask contains no compressed gas cylinders and regulating valves. It is light (5 pounds complete), compact and comfortable, and it offers practically no hindrance to the wearer's movements. A wide field of vision is secured and the eyepieces do not fog. It is easily and quickly put on. It requires no attention to valves and regulators while in use, and with ordinary care it will not get out of order.

McBride Communicating Mask--"Type "A"



Side View of Army and Navy Diaphragm Mask

Finally it gives protection against all harmful gases, smokes, and vapors likely to be encountered in industrial work.

Description of the Mask

The all purpose mask consists of three principal parts: Face piece, canister and carrier. The face piece may be either the standard army model (1919 face piece) or the new diaphragm face piece. The 1919 face piece is made of rubber stockinette, shaped to conform closely to the configuration of the face and is made in five sizes. Elastic head bands fit over the head and hold the face piece tightly but comfortably in place. Air enters the face piece through a corrugated tube terminating in two small tubes directly under the eye pieces, this arrangement preventing fogging. The eye pieces are made of non-shattering glass. Exhaled air leaves the face through a rubber flutter valve.

The diaphragm face piece is a modification of the 1919 model described above. It has all the advantages of the 1919 model and in addition is designed to overcome the speaking difficulties of the standard mask. A strip of gas and waterproof tracing cloth is inserted in the face piece just opposite the mouth and held there by an aluminum casting.

The canister is a modification of the 1919 outside container and is 7 inches high, 4⅝ inches long, and 3 inches wide, made of sheet tin 1/32 of an inch thick. In the bottom are two inlet valves of ⅝ inch in diameter and a dome 1 inch high. The dome is made of perforated metal permitting even distribution of the inspired air. The top edge of the canister carries lips 1½ inches long and ⅛ inch wide on opposite sides to hold the springs in place. The cover is made of the same material as the canister and fits the latter tightly. A nozzle 1 inch in diameter and 1 inch long is soldered to the outlet in the center of the cover. A rubber or metal check valve is placed between the two lengths of corrugated tubing connecting the face piece and canister. This valve prevents the moist exhaled air leaking back into the canister.

Rubber Softeners

The Rate of Depolymerization Decreases With the Advance in State of Cure It Was Found

By Paul M. Aultman and C. O. North

Lee Tire & Rubber Co., Conshohocken, Pa., and Rubber Service Laboratories, Akron, Ohio

THE literature on the subject of rubber compounding is comprised chiefly of articles on three raw materials: (a) crude rubber, (b) pigments, and (c) accelerators. It covers quite thoroughly the variations of plantation and wild rubbers, and lately it has considered the volume relations of the pigments as well as giving us better working theories on accelerators. One other class of substances, however, has not received the attention of the rubber chemists in proportion to the importance it assumes in most practical mixes. We will designate this class as "rubber softeners," which includes substances such as mineral rubber, oils, tar, pitches, resins, and gums. The organic accelerators commonly used may also be classified in this group, as they generally soften or render more plastic the uncured rubber.

Need for Rubber Softeners

Rubber softeners are added to mixes usually for two major reasons—first, to facilitate the processes of milling, calendering, and tubing; and, second, to cheapen the stock. The compounding of these into rubber gives us a wide variation in the characteristics of both cured and uncured rubber. In the milled batch the rubber becomes more plastic and more easily worked, even when very small amounts of some substances are incorporated. In the cured product the most notable effects usually are the lowering of the stress values of the stress-strain curve and the increasing of the elongation more than warranted by either any retardation of sulphur combination or mere filling action. There is some effect on the properties of the rubber mix diametrically opposed to that of finer pigments when added to rubber, as the pigments make the stock less plastic and raise the values of the stress-strain curve, as well as cutting down the elongation. This effect varies greatly, depending on the softener used, probably because softeners have some action on the rubber aggregate itself.

Rubber is generally considered a polymer of C_5H_8, the formula usually being written $(C_5H_8)n$, where n is a variable number which must be large. It may well be called the coefficient of polymerization. The processes of milling and calendering, as well as heat alone, cause changes in the plasticity of rubber which can be explained only by assuming that the value n decreases—in other words, the rubber aggregate is broken into small fragments. This is a reversible action as the rubber slowly recovers approximately its former properties. It is obvious that otherwise unexplained differences in crude rubber can be understood best by a conception of variations in the value of n. However, many softeners when added in such small quantities as one-eighth of one per cent, not only help to make the rubber more plastic, but even prevent it from going back to its former state. These softeners aid in the process of breaking down, and hence are depolymerizing agents. This depolymerizing action of the softeners is undoubtedly carried on into the aging of the rubber, where it prevents the formation of the larger aggregates, thus tending toward preventing shortness. We assume that aging consists in the formation of larger aggregates through the agency of sulphur and through a natural tendency of the rubber aggregate to revert to larger aggregates.

In the curing of rubber we must assume that there are two major factors—one a breaking down of the rubber aggregate, and the other a combination of sulphur and broken-down rubber aggregates. These processes can well be termed depolymerization and polymerization. Our interest in softeners lies primarily in their effect on depolymerization. Their effect on the combination of sulphur can be considered merely as a disturbing factor.

In order to find out this comparative depolymerizing effect, it was realized that the method of incorporating into a base stock in equal proportions and comparing the physical properties with those of the base stock, when both were vulcanized in the same cure, was the ultimate method of attack. However, this method, even though used with some interesting results in the case of pigments, has one serious fault—namely, that it does not bring into consideration another variable, that of a change of the state of cure. For instance, glue acts as a mild accelerator, according to our combined sulphur results, while clays often act as retarding agents. Comparison of any one effect can only be made when one variable is present. Inasmuch as the stress-strain curve is affected, not only by the state of cure, but also by the rapidity of the cure, it would be necessary for purposes of comparison to have the true combined sulphur the same at the cures tested. Any comparison tests which do not consider the coefficient of vulcanization cannot be accurate.

These difficulties caused us to select another more direct method for discovering the comparative actions of the various substances on vulcanized rubber. In introducing this method we realize its crudity and that the results may be of little value in solving the problem, but we believe that the results are at least of interest and that they may constitute a link in the chain of facts concerning rubber softeners.

Method

Briefly, this method consisted of heating vulcanized rubber in the softener until total disintegration ensued. An oil bath equipped with a constant-temperature controlling apparatus was used. In this bath flasks containing 150 cc. of the softener were placed. The temperature was kept at 140° C. When the temperature of the softener became 140° C., 1 g. of coarsely ground, vulcanized pure gum was stirred in, and the time required to secure disintegration noted. This procedure precluded the investigation of mineral rubbers or any tar-like bodies. The results also, owing to an indefinite endpoint, are only approximations. Some of the materials tested were taken merely as a matter of interest.

Action of Various Softeners

The time required for the various softeners to disintegrate the rubber was practically as follows:

Naphthalene	50 min.	
Paraffin	1 hr. 35 min.	
Kerosene	1 hr. 45 min.	
Paraffin oil	2 hrs.	
Xylol	2 hr. 20 min.	
Vaseline	4 hr. 30 min.	
Aniline	5 hrs.	
Ortho-tolnidine	5 hrs.	
Palm oil	10 hrs.	
Pine oil	12 hrs.	
Rosin	12 hrs.	
Oleic acid	12 hrs.	
Coconut oil	15 hrs.	
Stearic acid	16 hrs.	
Lard oil	30 hrs.	
Cottonseed oil	34 hrs.	(Not clear solution)
Corn oil	34 hrs.	(Not clear solution)
Soy-bean oil	38 hrs.	(Not clear solution)
Linseed oil	45 hrs.	(No change)
Castor oil	45 hrs.	(No change)

A number of other materials were tested but the results are not significant. The waxes and resins were very difficult to handle and did not give good results. It was observed that the time required for the saponifiable oils evidently had some

From Industrial & Engineering Chemistry, March, 1923, Pages 262-264. Presented at Meeting of American Chemical Society, Rubber Division, Pittsburg, Pa., Sept. 4-8, 1922.

relation to the iodine absorption number, as oils having a low number dissolved the rubber much faster than those of higher absorption number.

Effect of Blowing Oils

Castor oil was an exception probably due to the hydroxyl groups of the ricinoleic acid. As several chemists claimed that blowing semi-drying oils introduced =O or —OH groups into the acid group, several samples of corn and cottonseed oils were blown at different temperatures and their solvent effect compared with the untreated oil was noted. In every case the blown oil took longer to disintegrate the rubber.

Effect of Adding Sulphur

The time required for the terpenes was not in accordance with practical results, as these are known to be strong depolymerizing substances. This observation led to the belief that other factors modified their action. As sulphur is always present as the vulcanizing agent in practical mixes and as sulphur also reacts rather readily with terpenes, 4 g. were added to pine oil and the resulting solution was tried with the untreated oil as a check. The time required for disintegration was approximately 2 hrs., instead of 12 for the untreated oil. This oil gave such a remarkable change in the presence of sulphur that representative samples of other oils were tried, using the same proportions. Representative results are as follows:

	No Sulphur	With 4 G. Sulphur
Paraffin	1 hr. 30 min.	1 hr. 30 min.
Xylol	2 hr. 30 min.	2 hrs.
Coconut oil	14 hrs.	4 hr. 30 min.
Stearic acid	15 hrs.	4 hr. 30 min.
Aniline	5 hrs.	2 hrs.
Rosin oil	12 hrs.	2 hrs.
Cottonseed oil	35 hrs.	10 hrs.
Castor oil	No solution	

It will be noticed that the addition of sulphur in most cases accelerated the disintegration. That the quantity of sulphur used might add in swelling the jell is easily explained, as it has been definitely proved that sulphur does dissolve in rubber. However, the fact that the disintegration itself was hastened leads us to believe that sulphur itself acts as a depolymerizing agent. The theory that a substance acting as a vulcanizing agent should also be a depolymerizer is not contrary to the evidence, as several softeners having a strong depolymerizing action accelerate the addition of sulphur to rubber. The instance, a base stock of rubber, zinc oxide, hexamethylenetetramine, and sulphur gave a combined sulphur of 0.93 per cent at a cure of 40 min. at 290° C. Three per cent vaseline added raised this to 1.10 per cent, and the addition of 3 per cent naphthalene, to 1.04 per cent. These are selected as examples because the vaseline and naphthalene should not react appreciably with the sulphur. The fact that the stock in which the rubber has been broken down for a long time on a hot mill will give a higher coefficient at a given cure than the same normally broken down, is considered as contributory evidence. Depolymerization, then, aids sulphur addition, perhaps by increasing the number of aggregates available for sulphur combinations.

Action of Accelerators

As it follows that organic accelerators must also hasten depolymerization, the addition of these in the same amounts as the sulphur was tried. Thiocarbanilide, hexamethylenetetramine, and p-nitrosodimethylaniline were used. The time required to secure solution was generally greatly shortened. For instance, the time for stearic acid was cut from 14 hrs. to 6 hrs. and that of paraffin oil from 3 hrs. to 2 hrs. Here again we have an accelerating substance acting as a depolymerizer. It is noteworthy that accelerators usually soften the batch in which they are mixed.

Method of Swelling

The end-point of these experiments was, as before stated, rather indefinite. Hence, it was thought necessary to check the observations. Weighed pieces of vulcanized test sheets about 1 in. square were immersed in the softeners, heated to various temperatures, and after definite periods of time were taken out and the excess clinging to them removed. These pieces were then reweighed. The weight of softener dissolved in the rubber was thus noted. Some representative results are listed below:

	Relative Volume Increase—Per Cent*	
	No Sulphur Added	Sulphur Added
Naphthalene	273.0	282.0
Vaseline	59.0	81.2
Pine oil and rosin	44.0	69.0
Aniline	39.2	52.5
Cottonseed oil	31.3	47.0
Castor oil	....	....

*These samples were heated to 100° C. for 3½ hrs.

It was definitely shown that sulphur aids in the swelling of the rubber. However, the difference between the degree of action of the various substances was not so great as in the disintegration method. Evidently, the rapidity of disintegration depended on two factors—the rate of swelling, and the rate of disintegration of the rubber aggregate. These have a distinct relation. In previous work on the disintegration of rubber soles for the purpose of identifying pigments and fibres, it was noted that there was not nearly so marked a difference between oils in their ability to swell the rubber as in their property of breaking down the rubber itself to form a clear solution. Hence, the rate of disintegration gives us more nearly the measure of relative depolymerization effects of the various softeners. By the swelling method it was also found that accelerators materially hasten the swelling of the rubber and that the addition of both accelerator and sulphur causes a further increase over either used alone.

The retarding effect of four reinforcing pigments—zinc oxide, clay, glue and carbon black—in a stock was also investigated, with the result that it was found that equal volumes had practically the same effect when the coefficient was approximately the same. Fine pigments apparently retard the swelling of the rubber.

In previous work on rubber soles it was observed that when ground, cured scrap has been incorporated in the stock, this scrap was extremely hard to dissolve. This was thought to be due to the higher state of cure of this rubber as it had gone through two vulcanizations. To test this theory a number of tests were run by the solvating method. In every case, except in a long overcure on a low sulphur stock after all sulphur had been combined, this theory proved to be true. However, in the case of the overcured stocks, an increase in the amount dissolved in the rubber was observed. This increase took place shortly after a weakening of the stock was observed, judging from the stress-strain curves. At this point the stock had evidently passed the equilibrium point where the rate of depolymerization was equal to the rate of polymerization, and was then suffering a depolymerization alone because practically all the sulphur had been combined. The state of aggregation was then becoming more nearly that of the lower cures. The essential difference between the aggregates of low cure and this overcure was that more sulphur is combined with each aggregate combined in the overcure.

An interesting conclusion can be made from this last experiment—the higher the state of cure the slower the rate of depolymerizing becomes. This means that the greatest depolymerization action takes place in the raw stock or at the lower states of cure. Whether or not this depolymerization is beneficial remains to be seen. From physical tests alone the evidence is strongly against undue depolymerization, as the more rapid the cure the higher the tensile which can be obtained. Thus, the thiocarbamates give us extraordinary tensiles, such as 3000 lbs. (with a 5-min. cure) per sq. in., in nearly pure gum stocks, while a sulphur-rubber mix requiring 3 hrs. to obtain an approximately optimum cure will give us only 1500 lbs. per sq. in. In the first case less than 1½ per cent of sulphur combines with the rubber, while in the latter more than 3 per cent combines. However, as the aging is of supreme importance it remains to be proved whether or not the property is benefited. It remains to be proved that we must strive to keep depolymerization down to a minimum or plan to secure a certain amount in order to obtain good aging. The authors maintain that until depolymerization is thoroughly understood and measured and until the effect on aging is determined, very little progress can be made toward making rubber compounding a science instead of the meaningless mass of data which it is at present. Tests are now being made with little or no consideration of the greatest of variables—depolymerization.

ABSTRACTS

Technical — General — Commercial

Persistence of Calender Grain after Vulcanization*

An interesting characteristic of rubber is the anisotropy in its physical properties, brought about by mechanical working.

It was observed that many articles of vulcanized rubber—such as inner tubes, rubber footwear, solid tires—show evidence of "grain" after vulcanization. The "grain" effect was attributed to a dual origin, part being laid to the rubber phase and part to the pigment phase present in the mixture. It was argued that if "vulcanization were carried out under controlled conditions, it might be shown that persistence of 'grain' was a function of the degree of freedom of the sample during cure."

As a result five compounds, used in works practice, were chosen as follows: Pure gum tube compound, containing only rubber; high-grade zinc oxide tube compound, including rubber and zinc oxide; red antimony tube compound, being made up of rubber and antimony containing 40 per cent calcium sulphate; first-grade shoe upper compound, containing rubber, whiting, litharge and gas black; and finally a shoe soling compound, made up of rubber, whiting, litharge and gas black.

The general conclusions arrived at were: "Grain" effect may persist after vulcanization over a wide range of compounds, including pure gum. That the pigment effect persists under all conditions although definitely influenced by the curing method. That the rubber phase can be preserved or obliterated during vulcanization, according as the sample is imprisoned or markedly distorted during the cure.

The paper is also well illustrated with charts, as well as containing technical information demonstrated through the use of formulas.

*By W. E. Weigand and H. A. Braendle, presented before the Division of Rubber Chemistry at the 64th Meeting of the American Chemical Society, Pittsburg, Pa., Sept. 4 to 8, 1922. From *Industrial and Engineering Chemistry*, March, 1923.

Estimating Volatile Substances in Air of Rubber Factories

An interesting method of determining the amount of volatile substances in the air of rubber factories is described in the *Jour. Russ. Phy. Chem. Soc.* volume 52, pages 212 to 226. The method was elaborated for the purpose of determining the percentage of light petroleum vapor contained in the air of rubber factories consists essentially in freezing out the light petroleum in two weighed U-tubes, each cooled by immersion in liquid air. In order to prevent choking of the tubes by the frozen petroleum, the tubes are packed with magnesium turnings. Before being passed through these tubes, the air is freed from dust, moisture and carbon dioxide by passage through tubes containing in order soda-lime, calcium chloride, phosphoric anhydride and cotton wool.

Purification of Crude Rubber

The process of purifying crude rubber, which is described in French Patent No. 539,741, makes use of an automatic drying and washing device. The washer is composed essentially of two cylinders, forming a rolling machine and provided with a system of spraying or washing and surrounded with a perforated rotating drum. The cylinders are furnished as well with internal grooves. The rubber is introduced in small pieces and is passed between the rolls several times. The drier is similarly constructed, consisting of a rotating drum, provided with agitators and paddles. The apparatus can be heated and a vacuum can be applied.

Thermal Changes During Vulcanization*

The object of this paper is to describe a method of determining the intensity of the energy changes during vulcanization and to calculate their approximate amount. The author points out that there is only a small evolution of heat generated at first by the mixture; that there is a slight absorption of heat noticeable near the end of the reaction; that the heat liberated is due to rubber-sulphur reaction, because there is no measureable heat liberated in the reaction between rubber-accelerator, sulphur-resin, or sulphur accelerator; and, finally, that there is an increase in the velocity of the reaction, caused by accelerators, increased in per cent of sulphur, or increased in temperature. The primary change, however, is due to the heat of reaction between sulphur and rubber. The above conclusions were arrived at after conducting a series of experiments.

In the first test heating was done in a glycerol bath of about one-liter capacity, temperature not varying more than 1 degree C. In the second series of experiments a specially arranged calorimeter was used, which could be supplied with a constant amount of heat. A temperature of 172 degree to 176 degrees C was maintained, a small loss of heat being noticed, because rubber is a poor conductor of heat. Other experiments showed that heat liberated was produced either by the action of sulphur on resin, sulphur on accelerator, or accelerator on the rubber. A rough idea of the amount of heat liberated was calculated by the use of this formula: $\frac{R-r}{R} = T$, in which R is the radius of the cylinder, r, the distance from the center to any point in the cylinder and T is the maximum temperature difference between the center and outside of the cylinder.

*Presented before the Division of Rubber Chemistry at the 64th Meeting of the American Chemical Society, Pittsburg, Pa., Sept. 4 to 8, 1922. By Ira Williams and D. J. Beaver. From *Industrial and Engineering Chemistry*, March, 1923.

Plastic Rubber Compositions

In compounding rubber and in the manufacture of articles from the compounded material, the greatest weakness which is found in the rubber mass is not in the substance of the rubber nor of the undissolved filler but in the surface of contact between the two. This weakness is of a two-fold nature, both mechanical and electrical. The presence of absorbed air in the filler is detrimental to the properties of the resulting compounded rubber. In this connection attention is called to the fact that the removal of small amounts of moisture from the fillers prior to the compounding of the same with the rubber mass is detrimental and undesirable in that it may permit the subsequent absorption of additional quantities of air. Rubber is ordinarily saturated with air and unable to dissolve larger quantities, but it is not normally saturated with water and so can take up a certain amount of water from the particles of filler, with consequent more intimate contact between these and the rubber. In order to produce a plastic composition containing intimately mixed filler, the latter is previously degasified by heating at a temperature of 300 to 500 degrees C or at a lower temperature under reduced pressure. The gas-free material, for example whiting, can be used directly or can be treated with a medium which will prevent the reformation of absorbed air films about the filler. This further treatment consists of impregnation of the powder with rubber solution or preferably with a gas, such as carbon dioxide, which will dissolve in the rubber. (British Patent No. 182,422)

Practical Testing of Crude Rubber

By Dr. O. de Vries,

Director of the Central Rubberstation, Buitenzorg, (Java)

TO one who visits rubber factories it is a rather striking fact that in many cases a considerably larger amount of attention is paid to the control and testing of pigments, fillers and so on than of the chief raw material, rubber. The reason for this is, of course, not far to seek. On some points our knowledge of rubber has reached a high state of development, and properties such as rate of cure and tensile strength are now well understood and can be tested and studied in a quite satisfactory manner; but on other points, including such important ones as plasticity, flowing capacity, etc. our scientific knowledge is still very deficient, and suitable methods of testing have not yet been worked out.

Rubber testing, even if the most up-to-date methods and data are used—which means a well trained technical staff, not overburdened with other work—at its best only gives a control over certain groups of properties such as the vulcanizing properties, but leaves others such as milling, mixing and flowing quite untouched, and therefore is unsatisfactory to the practical man. Fortunately our knowledge of rubber is growing with rapid strides by the combined efforts of rubber chemists all over the world; the advantages are now generally recognized of broad minded publication of everything that is related to basic principles and to the fundamental knowledge of rubber—the things that every rubber chemist has to know—and secrecy is more and more restricted to special applications and new factory processes. It may confidently be expected that the present difficulties will soon be overcome so that the testing of raw rubber can take the place that it deserves.

In the mean time at present some solutions can undoubtedly be reached by rather simple means, which are of course well known to those who keep in close touch with the literature on the subject, but about which a few casual remarks may perhaps be of value to those who cannot spend much time on testing research and on the study of technical journals. Adequate testing of crude rubber is of as much importance to the high standard producer, who wishes the care he takes in preparing his product to be known an acknowledged, as to the consumer who benefits by high and uniform quality or pays the penalty for unexpected shortcomings in the raw material.

1. Sampling

A first, seemingly very obvious, but still not superfluous suggestion would be that the man who is responsible for the report on rubber inspects the whole lot himself and if possible controls the sampling.

The monthly output of an average estate is about 15-20 tons first grade; large consignments, especially when bought far from the original markets, nearly always consist of a number of smaller lots from different estates. Moreover not unimportant amounts of "standard" and "off grade" are sorted, mixed and repacked by dealers; such lots can mostly be recognized easily enough at a close inspection by the differences in the pattern, size and thickness of the sheets in one case, or by the differences in color, breadth and structure of the crepe.

It is all very well for big dealers to ship the cases with their own special markings, so as to give the buyer the agreeable idea that he gets a well sorted, homogeneous lot. But this simple procedure, attractive as it may be, does not make plantation rubber more uniform than the estates produce it, and it considerably complicates the task of those who have to sample and judge the lot. One may pity the chemist who has to find his way amongst denominations in several Eastern languages; but paying attention only to the initials of a firm of dealers instead of to the variety of original marks on the cases means following the policy of the ostrich which, putting its head under its wing, eases its mind by reasoning: I don't see my pursuer, so he does not see me and cannot catch me.

A little attention paid to the marks on the cases will easily allow one to sort the consignments into different lots. If the variety of marks on the cases is found too bewildering, a closer survey of the contents may still prove very useful. In the same way an inspection of the different cases of one lot will reveal whether the lot is homogeneous and if not, of how many different types it is at least composed. Taking one or a few samples at random from such lots is practically useless, as it teaches the properties of only part of the lot. The sampling should be done according to the degree of homogeneity of the lot, and according to the use the rubber is going to be put to: as a whole, or split up for different purposes.

By a careful inspection of the raw rubber, paying due attention to the marks on the outside of the cases and to the exterior appearance of the rubber, and by basing thereon the way in which the contents of different cases have to be mixed, a constant supply may be obtained from day to day, and the chemist may often avoid a lot of trouble in the factory. We even go so far as to say that it is better not to do any testing at all, but to pay sufficient attention to the grading and mixing of the raw product, than to do a series of careful tests on carelessly taken samples which give an incomplete or even a false idea of the properties and variability of the lot.

Of course, full advantage of such an inspection can only be gained by those who are familiar with the preparation and handling of rubber in the East, and who understand the messages concerning origin, type, grading, etc., which the planter tries to convey to the user on the outside of the case in the form of estate name, grade and undergrade marks, etc.—messages, by the way, which now mostly do not attract the manufacturer's eye even if they have not disappeared in an earlier stage when the dealer, in his keenness to simplify and make uniform matters for the manufacturer, erased them.

In all testing work the sampling and inspection of the material is the principal point, and the testing itself should take only a second place; and this certainly holds for plantation rubber which comes from several thousand different estates.

2. Chemical Testing

Though vulcanization testing certainly is the most important part, simple chemical analyses may give valuable indications and perhaps deserve more attention than at present. As a relic of old times, when wild rubbers played an important role, the extraction with acetone still takes first place in the mind of many rubber chemists; but for normal plantation rubber the variation in acetone extract is only small and not related to any important property, so that the conclusions to which this figure may lead do not seem to be of much value[1].

The ash, on the contrary, might play a more important role than at present, especially when doubtful types of sheet or blanket from the East are to be tested. Coagulation with alum, which causes abnormally slow vulcanization, and is furthermore a sure indication that native or inferior Chinese rubber is present, is most easily detected by an ash determination, figures of 0.5 or higher being found in such cases. A further examination of the ash (treatment with acids, microscopic examination) teaches the amount of sand or grit, and eventually may furnish the positive proof that alum was present. The ash content of first grade plantation rubber is 0.25-0.30%; rather high figures point to the use of undiluted

[1]The statement of S. S. Pickles (see *Rubber Age*, London, Vol. II pages 545 and 556) that the acetone extract gives valuable indications as to the behavior in a mixture containing lead oxide has not yet been proved by figures, but deserves attention.

latex in coagulation, low figures such as 0.20 to 0.15 indicate coagulation from very dilute latex, rainy days, etc., generally accompanied by a somewhat slower cure.

The watery extract (obtained by heating on the waterbath 3 grams of the finely cut sample with 100 c.c. of distilled water for 6 hours, heating the residue for 2 hours with a fresh portion of 50 c.c., evaporating the extract to dryness and dry at 100° C) may also give indications as to the method of preparation, a lower figure being found, the more the rubber has been treated with water during preparation[2]. Further research will have to show whether the water treatment during preparation is or is not one of the causes of differences in plasticity of the crude rubber, but the watery extract is one of the ways to gain some insight in the method of preparation which should not be neglected.

3. Vulcanization Testing

The methods of testing crude rubber used in the Central Rubber-station, which we published in detail elsewhere[3], have been worked out so as to obtain a high degree of accuracy, as is necessary for a testing station of a public character, the reports of which may have to pass from hand to hand. Rubber testing in a rubber factory can be conducted along simpler lines. In several cases the only aim is to decide whether a certain rubber is fit for a certain manufacturing purpose, or for what class of goods a certain lot shall be used. Testing in a mixture very similar to the factory mix is then resorted to, and the actual figures are not of so much importance as the conclusion "up to the purpose or not." In other cases the chemist will have to go deeper into the question; but it is not saying too much that the methods at present used, though often very elaborate, do not always give as clear an insight as might be possible with our present knowledge, nor is the often large amount of testing figures always used to the greatest advantage.

For instance, one mix is often given a number of cures, sometimes five or even ten. Now tensile strength and rate of cure, if these properties are taken in a well defined sense, may be determined by one appropriate cure or at the most by two (a trial and a final vulcanization). Making a series of cures with one mix is only useful to determine the "broadness of peak," the way in which the tensile strength changes with overcure. Now this broadness of peak is certainly a most important property in the study of different compounds, which one naturally desires to be as fool proof as possible.

Perhaps it may also be of importance when comparing different types of rubber, for instance plantation with Hard Fine, since for the latter a broader peak is claimed (though figures which prove this contention not yet been published.) But there are no indications that ordinary plantation crepes or smoked sheets differ considerably in broadness of peak, and it would seem useless to make a series of cures with one mix when simply testing first grade crude plantation rubber. Making the same total number of cures, but one with each of a number of samples from the same lot, would give a valuable indication as to the degree of uniformity in rate of cure, a property which it is of more importance to determine in plantation rubber than broadness of peak, but for which no appropriate tests are made in many laboratories. Taking 10 to 20 samples from one lot of rubber, mixing them each separately with sulphur (say 100 to 8), curing these mixes together and comparing the curves obtained after such a cure (for instance the loads at a fixed length, or the lengths at a fixed load) very easily gives an insight into the degree of variability in rate of cure and teaches whether the lot is homogeneous, or whether a careful mixing of the contents of different cases is necessary to make sure of a uniform supply.

For determining the rate of cure and the variability in rate of cure, the pure rubber sulphur mix is now generally acknowledged as the most suitable one. We would like to lay stress on the point that in such testing one cure for each mix should be sufficient, but that a large number of samples should be taken from one lot, which may then be cured together to determine the variability in rate of cure.

[2]For figures and examples see "Estate Rubber, its Preparation, Properties & Testing" by Dr. O. de Vries, page 612.

[3]"Estate Rubber its Preparation, Properties & Testing," chapters XVII and XVIII.

For determining the tensile strength some prefer to take test mixtures containing other compounds; and, as in this case one wants to know the average figure, an average sample can be used, obtained by thoroughly mixing a number of samples from different cases.

The above meant simple test for uniformity (comparing the lengths at a fixed load for a number of samples cured together) is somewhat inconvenienced by the fact that the straight, dumbbell shaped test piece is so generally used in America, because this type of test piece does not allow more than a very rough reading of the length or elongation. It is not easy for one eye to follow the upper mark on the test piece while the other eye has to follow the lower one some 8 to 9 inches away; moreover, the original marks, during stretching, extend to a blot of ¼ or even ½ inch breadth, so that accurate reading of the elongation is impossible. The consequence is that the elongation is generally only given in inches and halves, say 8, 8½ or 9, so that one reads in percentage of the original length only the figures 800, 850, 900 etc. With a Schopper machine and ring test pieces the elongation is read in units (for instance 800, 801, 802 etc) and one is quite sure of differences of 5% in length or less, while with the straight test piece only the fifties are read. Now 50% elongation in a rubber sulphur mixture means 10 to 15% difference in time of cure. For a properly uniform rubber a variability of not more than ± 10% is stipulated by those manufacturers who have studied the question of how uniform the best grades of plantation rubber should be; and it will be clear that the testing method has to give figures for elongation much more accurate than are now mostly obtained with straight test pieces, if one wants to be able to determine differences of 10% or less in rate of cure.

Moreover, the ring test piece enables one to record the curves graphically, which is a more accurate and much quicker way of obtaining the form of the curve than by plotting elongation against load, and makes it possible to work the machine with one operator instead of two. The original theoretical objection against ring test pieces—viz., that the outer circumference of the ring is stretched to a percentually smaller degree than the inner one—seems of no practical importance[4], and surely does not counterbalance the above discussed disadvantages of the straight test piece.

Of course we know that improved methods of testing with straight pieces are in use here and there; but at all events it would seem desirable that a critical study is made of the testing methods at present in use and that they are revised where necessary, so that the highest degree of efficiency is reached. Routine testing is only of value if based on adequate methods, and in research work so many important problems urgently await solution that only the best methods and apparatus should be used, so that no time is lost in collecting unnecessary or insufficiently accurate figures.

[4]Compare "Estate Rubber, its Preparation, Properties & Testing" page 523.

Tire Market of New Zealand

THERE is no system in New Zealand for registering motor cars such as prevails in the United States. Each district has its own registering authority and the registrations run from the beginning of motoring to date. The following estimate is conservative and as nearly accurate as it is possible to obtain. There are about 40,000 passenger cars in the country, 9,000 of which are in the Auckland district. Approximately 10 per cent of these cars require straight side tires. Dealers' estimates vary widely as to the percentages of cars using metric and inch clinchers, but it is generally believed that the metric clinchers are more common. A few American-made passenger automobiles having metric clinchers are still being imported. Of the estimated 5,000 motor trucks in New Zealand, about 1,000 are in the Auckland district. About 25 per cent of the truck tires used are pneumatics. American makes of tires are most popular, followed by French, English, and Australian.

MARKETS

Cottons and Fabrics

NEW YORK, May 3, 1923

A backward and forward swing characterized the cotton market during the last period. During one of the backward movements May contracts came as low as 26.90 cents and October 23.75 cents about 3½ to 4½ cents a pound below the record figures last March. No really new circumstance was disclosed. There was no change in the conditions surrounding the old crop or the new crop. Consumption by the mills continued very heavy, exports continued to fall off and the visible supply of American and World cotton continued to decrease.

So far as the new crop is concerned there was the report of the Department of Agriculture giving an estimate as of April 10 of 12 per cent increase in the acreage planted. The carry over of all cotton in the United States, which includes 100,000 bales of foreign cotton, was estimated to be 1,184,000 bales.

This unusual report of the Department, which is based not on acreage planted, but on data collected as to the intentions of the cotton planters, aroused some indignation in the cotton belt and a concurrent resolutionwas adopted by the Texas senate requesting the President and Attorney General to investigate the report which was declared to be "untimely and unwarranted" and injurious to cotton farmers.

The exports of American cotton for the cotton season up to April 6, 1923 shows a total of 4,074,955 bales. This compares with 4,449,106 bales in the corresponding period of 1922, with 3,930,599 in 1921, with 5,439,749 in 1920 and with 7,979,700 in the same period ended April 3, 1914. Prior to 1922 the four year average was 4,368,332 bales. The largest part of the 3,904,745 bales decrease as compared with the year 1914 was due to diminished shipments to England, France and Germany; England taking 1,818,717 bales less, France, 487,538 less and Germany, 1,760,492 less.

Cotton prices as of May 3 on the New York Cotton Exchange follow:

	Open.	High.	Low.	Close.	Previous Day.
May	27.67	27.67	26.93	26.93@26.95	27.75
July	26.38	26.40	25.66	25.68@25.70	26.50
Oct.	24.05	24.05	23.75	23.78@23.82	24.12
Dec.	23.60	23.65	23.29	23.35@23.40	23.65
Jan.	23.33	23.33	23.06	23.06@23.10	23.35

High Cotton Prices Likely

The Federal Reserve Bank of Boston, in a review of the serious cotton situation, comes to the conclusion that a new crop of the average size of the past ten years will not prevent a continuence of high prices. The essential point at the present time is to realize that it will require growing conditions better than those of recent years to make cotton plentiful and cheap. "Present conditions are, to quite an extent, the result of internal conditions within the industry rather than of outside influences such as the general business situation," says the writer.

Abnormal Conditions Prevailed

"During the past three years the cotton manufacturing industry has been operating under abnormal conditions due to wide fluctuations in raw cotton prices. After declining rapidly from the peak reached in 1920 to a figure lower than the pre-war level the price of raw cotton has since recovered to a point relatively higher, when compared with the general price level, than at any time during the period of war and post-war inflation. These wide price changes represent the efforts of the cotton market to adjust itself to the varying conditions in production and demand.

The 1920-21 Carryover

"In the midsummer of 1920, before the cotton crop of that year was harvested, there was a carryover from previous crops of 3,500,000 bales. The crop harvested in the fall of 1920 was fully of average size. But during the year between Aug. 1, 1920, and July 31, 1921, both exports of raw cotton and domestic consumption decreased to 20 per cent below normal, so that by the end of the cotton year, July 31, 1921, there were 6,500,000 bales on hand.

"In view of this large carryover, as well as the low price at which cotton was selling in the spring of 1921 (it was then below the pre-war level), there was a concerted movement to reduce the acreage planted to cotton, which succeeded so well that the reduction in acreage from the previous year was approximately equal to that attained in 1905 and 1915, former record years in point of acreage reduction.

Acreage and Growing Conditions

"The result of the curtailment in acreage in 1921 was very different from that in 1905 and 1915, inasmuch as the size of the crop itself depends more on growing conditions than on changes in acreage. While the yield per acre in 1905 and 1915 ranged from 175 to 200 pounds, in 1921 it declined to 125 pounds, and the cumulative effect of a 15 per cent reduction in acreage and a 30 per

(Continued on Page 108)

EXTRA STAPLE COTTON

Business in extra staple cotton was somewhat better the last week of the period and mills showed more interest than in some time. Most of the business was in the extra staples of high grade. Quotations on strict middling cotton, classed as to a very exacting standard of stapling are as follows:

1 1/8 inch, 32 to 33 cents
1 3/16 inch, 33½ to 34½ cents
1 1/4 inch, 35 to 36 cents
1 5/16 inch, 38 cents upward

Pimas are unchanged with No. ones at 37½ cents; No. twos at 36½ cents and No. threes at 35½. Peruvian Mitafifi brings 31 to 32 cents for medium grade and higher grades run up to 33½cents. Tangris is quoted at 34 cents for average strict middling grade. Egyptians showed a little more strength and medium grade uppers on spot are quoted at 32 to 33 cents. Medium grade Sak on spot is offered at 35 cents and shipment cotton 36 to 37 cents.

CORD FABRICS			
Combed Sakellarides		.80 @	.85
Combed Peeler	lb.	.74 @	.77
Carded Peeler	lb.	.63 @	.66
Combed Egyptian uppers	lb.	.74 @	.76
Carded Egyptian uppers	lb.	.67 @	.71
SQUARE WOVEN			
17¼-ounce Egyptian uppers, combed	lb.	.72 @	.74
17¼-ounce Egyptian uppers, carded	lb.	.64 @	.67
17¼-ounce Sakellarides, combed	lb.	.78 @	.83
17¼-ounce Peeler, combed	lb.	.72 @	.75
17¼-ounce Peeler, carded	lb.	.61 @	.63

SHEETINGS—The market was weak and the little business that was done represented buying for immediate needs. 40 inch, 3.60 yard, brought 14¼ cents and some 40 inch, 2.85 yard, was sold at 16 cents.

DUCKS—The mills are not over anxious to sell far ahead on account of the uncertainty of the cotton market. Quotations were lowered on some constructions reflecting the weakness in the raw material market.

SHEETINGS			
40-inch 2.50-yard	yd.	.18½ @	—
40-inch 2.85-yard	yd.	.16 @	—
40-inch 3.15-yard	yd.	.16¼ @	—
40-inch 3.60-yard	yd.	.14¼ @	—
40-inch 3.75-yard	yd.	.12¾ @	—
40-inch 4.25-yard	yd.	.11 @	—
DUCKS			
Belting	lb.	.47 @	.49
Hose	lb.	.47 @	.49
Enameling	lb.	.51 @	.56
Shoe Ducks	lb.	.55 @	.58
Single filling	lb.	.22½ @	.25
Double filling	lb.	.24½ @	.27
BURLAPS (Carload Lots)			
7½-ounce 40-inch		6.20 @	6.25
8 -ounce 40-inch		6.25 @	6.30
10 -ounce 40-inch		7.65 @	7.70
10½-ounce 40-inch		7.70 @	7.75
DRILLS			
37-inch 3.25-yard	yd.	.14¾ @	—
37-inch 2.75-yard	yd.	.16½ @	—
37-inch 3.00-yard	yd.	.15¾ @	—
37-inch 3.50-yard	yd.	.14¼ @	—
37-inch 3.95-yard	yd.	.12½ @	—
OSNABURGS			
30-inch 7-ounce		.18 @	—
40-inch 7-ounce		.19¼ @	—

Chemicals and Compounding Ingredients

THE INDUSTRIAL CHEMICAL MARKET—NEW YORK, May 3, 1923—Business generally in industrial chemicals was not as active during the last period as it was in the early part of April. This condition was more evident in the spot market as consumers seemed to be sufficiently stocked for the time being. Withdrawals against existing contracts were fairly active and helped to keep the market in its firm position. At no time did there develop any particularly weak spots. In fact the call for some materials, such as carbon black, the zinc oxides, lithopone and litharge, which have been in heavy demand by the rubber industry since the first of the year, is keeping makers up to capacity production. The outlook for continued demand from the tire trade is very promising.

ACCELERATORS

Organic			
Aldehyde ammonia, crystals	lb.	$ .90 @	.95
Aniline oil, drums	lb.	.16½ @	.17
Diphenylguanidine	lb.	1.20 @	—
Excellerex,	ton	17.00 @	—
Formaldehyde-Aniline	lb.	.50 @	.52
Hexamethylene-tetramine	lb.	.90 @	.95
Paraphenylenediamine	lb.	1.55 @	1.60
Thiocarbanilide, kegs	lb.	.27 @	.30
Vulcocene	lb.	.35 @	—
Inorganic			
Lead, sublimed blue	lb.	.09¼ @	—
Lead, white	lb.	.09¼ @	—
Litharge, domestic	lb.	10.90 @	11.74
imported	lb.	.17 @	—
Lime, superfine	lb.	.02 @	.02½
Magnesia, calcined, light,	lb.	.23 @	.24
extra light	lb.	.45 @	—
heavy	lb.	.05 @	.06
Orange Mineral	lb.	14.40 @	14.50

COLORS

Blacks			
Carbon Black	lb.	.20 @	.25
Micronex	lb.	— @	—
Lamp Black	lb.	.12 @	.40
Bone "	lb.	.05½ @	.07½
Drop "	lb.	.07½ @	.10
Ivory "	lb.	.15 @	.45
Blues			
Prussian	lb.	.55 @	.60
Ultramarine	lb.	.18 @	.35
Cobalt	lb.	.21 @	.26
Browns			
Iron oxide	lb.	.03¾ @	.06
Sienna, Italian,	lb.	.06 @	.08¾
Umber, Turkey,	lb.	.04 @	—
Vandyke, domestic	lb.	.03½ @	.04
Greens			
Chrome, light	lb.	.32 @	.34
medium	lb.	.35 @	.36
dark	lb.	.36 @	.45
commercial	lb.	.12 @	—
Reds			
Antimony crimson, 15/17% F.S.	lb.	.34 @	.44
sulphur free	lb.	.39 @	.50
golden, 15/17% F.S.	lb.	.32 @	—
calcium and sulphur free	lb.	.40 @	—
red sulphuret 15/17% F.S.	lb.	.19½ @	—
Indian, English,	lb.	.12 @	.15
Para toner	cwt.	1.00 @	1.10
Toluidine toner	lb.	2.10 @	2.25
Venetian red	lb.	.03½ @	.06
Vermillion, quicksilver, English	lb.	1.20 @	—
domestic	lb.	.25 @	.30
Whites			
Albalith	lb.	.07 @	.07½
Aluminum bronze	lb.	.55 @	.60
Azolith	lb.	.07 @	.07½
Lithopone, domestic (factory)	lb.	.07 @	.07½
Zinc Oxide—American Process			
American Horse Head special	lb.	.08½ @	.09
XX red	lb.	.08 @	.08½
American Azo: ZZZ (lead free)	lb.	.08 @	.08½
ZZ (under 5 per cent leaded)	lb.	.07¼ @	.07¾
Z (8-10 per cent leaded)	lb.	.07¼ @	.07¾
Zinc Oxide—French Process			
White seal	lb.	.12 @	.12¼
Green seal	lb.	.10¾ @	.11¼
Red seal	lb.	.09¾ @	.10¼
Yellows			
Chrome, light		.20 @	.21
dark and medium	lb.	.20 @	.21
Cadmium Sulphide	lb.	1.50 @	1.75
Ocher, French	lb.	.02½ @	.03½
domestic	lb.	.02½ @	.03

COMPOUNDING INGREDIENTS

Aluminum flake	ton	25.00 @	30.00
hydrate	lb.	.19 @	.21
Ammonia carbonate,	lb.	.07¾ @	.10½
Barium carbonate	ton	.70 @	.75
Barium Dust	lb.	.05 @	—
Barytes southern off-color,	ton	15.00 @	20.00
Western, prime white	ton	28.00 @	—
Basofor	lb.	.04¾ @	—
Blanc fixe, dry f.o.b. works	lb.	.04 @	.04½
Carrara filler	lb.	.01½ @	.02
Chalk, precipitated, extra light	lb.	.04¼ @	.05
heavy	lb.	.03¼ @	.04
Clay, China, domestic,	ton	15.00 @	16.50
imported	ton	16.25 @	23.25
Dixie	ton	22.00 @	32.00
Blue Ridge	ton	20.00 @	30.00
Fossil flour	ton	60.00 @	—
Glues, extra white	lb.	.30 @	.40
medium white	lb.	.20 @	.26
cabinet	lb.	.18 @	.30
cabinet low grade	lb.	.16 @	.19
common bone	lb.	.08½ @	.14
Graphite flake, bbls.	lb.	.05 @	.06
amorphous	lb.	.05 @	—
Infusorial earth, powdered	ton	60.00 @	—
bolted	ton	65.00 @	—
Liquid latex	gal.	1.30 @	—
Mica, powdered	lb.	.15 @	—
Rotton Stone (powdered)	lb.	.02½ @	.04½
Silica (gold bond)	ton	31.00 @	—
Soapstone, powdered	ton	12.00 @	15.00
Starch, powdered	cwt.	2.80 @	2.90
Talc, domestic	ton	15.00 @	18.00
French	ton	20.00 @	—
French, high grade	ton	40.00 @	—
Italian	ton	47.00 @	58.00
Terra Alba	cwt.	1.85 @	2.00
Tripoli, white	lb.	.02 @	.02½
Whiting, commercial	cwt.	1.00 @	1.25
Quaker	ton	13.00 @	15.00
English, cliffstone	cwt.	1.50 @	2.00
gilder's bolted	cwt.	1.10 @	1.25
Paris white American	cwt.	1.25 @	1.50
Wood pulp XXX	ton	35.00 @	—
" " X	ton	25.00 @	—
Zinc Oxide— 5 per cent leaded		.07¼ @	.07¾
10 per cent lead sulphate	lb.	.07¼ @	.07¾
20 per cent lead sulphate	lb.	.07¼ @	.07¾
35 per cent lead sulphate	lb.	.07¼ @	.07¾

(Also see whites)

MINERAL RUBBER

Gilsonite	ton	65.00 @	—
Genasco (factory)	ton	60.00 @	—
Hard hydrocarbon	ton	33.00 @	42.00
Soft hydrocarbon	ton	32.50 @	38.00
Pioneer M.R.	ton	42.00 @	44.00
320/340 M. P. hydrocarbon (c. l. factory)	ton	45.00 @	50.00
300/310 M. P. hydrocarbon (c.l. factory)	ton	40.00 @	45.00
Synpro, granulated, M. R. (factory)	ton	55.00 @	65.00

SOFTENERS

Acids			
Acetic, 28 per cent	cwt.	3.17½ @	3.92½
Cresylic, 97 p.c.	gal.	1.25 @	1.30
95 p. c.	lb.	.75 @	.85
Muriatic, 20 degrees	cwt.	1.00 @	1.10
Nitric, 36 degrees	cwt.	4.50 @	5.00
Sulphuric, 60 degrees	ton	9.50 @	12.00
66 degrees	ton	15.00 @	16.00
Tartaric, crystals	lb.	.35 @	—
Alkalies			
Caustic soda, 76 p.c.	cwt.	3.50 @	3.75
Soda ash, 58 p.c.	cwt.	1.95 @	2.30
Oils			
Castor, No. 3, bbls.	lb.	.14 @	—
Corn, crude, bbls.	lb.	.12½ @	—
refined	lb.	.13¾ @	—
Chinawood, bbls.	lb.	.40 @	.42
Cottonseed,		.10 @	.12½
Glycerine, drums	lb.	18½ @	.19
Linseed, domestic	gal.	1.12 @	1.19
imported	gal.	1.10 @	1.15
Palm Niger		.09½ @	—
Lagos	lb.	.08⅞ @	—
Peanut, domestic, crude	lb.	.15 @	.16
Pine, steam distilled	gal.	.75 @	.80
Rapeseed, refined	gal.	.85 @	.88
blown	gal.	1.00 @	1.05
Rosin, first refined	gal.	.46 @	—
second refined	gal.	.45 @	—
Tar, commercial	gal.	.31½ @	—
Soya Bean		.13 @	.14¼
Petrolatum, standard	lb.	.05 @	.08
dark amber	lb.	.04 @	—
Resins and Pitches			
Cumar resin, hard	lb.	.09 @	.10
soft	lb.	.09 @	.10
Tar Retort	bbl.	12.50 @	—
kiln burned	bbl.	13.50 @	—
Pitch, Burgundy	lb.	.05 @	.06
coal tar	lb.	.01½ @	—
pine tar	lb.	.03 @	—
Rosin, grade K	bbl.	6.45 @	—
Shellac, fine orange	lb.	.90 @	—
Solvents			
Acetone, drums	lb.	.21 @	—
Alcohol, denatured, No. 1 bbls.	gal.	.43 @	.45
Benzol, 90 per cent	gal.	.27 @	.33
pure	gal.	.30 @	.35
Carbon bisulphide,	lb.	.06 @	.06¾
Tetrachloride	lb.	.09 @	.10½
Dimethylaniline	lb.	.42 @	.43
Motor gasoline, steel bbls.	gal.	.22½ @	—
Naptha, V. M. & P.	gal.	.21½ @	—
Toluol, pure	gal.	.30 @	.35
Turpentine, spirits	gal.	1.39 @	—
wood	gal.	1.28 @	—
Waxes			
Beeswax	lb.	.30 @	.45
Carnauba, No. 1		.42 @	.43
Ceresin, white	lb.	.10 @	.11
Bayberry	lb.	.25 @	.26
Montan, crude	lb.	.04½ @	.05
Ozokerite, black	lb.	.23 @	.24
green	lb.	.27 @	.28
Paraffine	lb.	.03 @	.05
Sweet wax	lb.	.10 @	.12

SUBSTITUTES

Black	lb.	.09 @	.13
White	lb.	.09½ @	.16
Brown	lb.	.09 @	.15
Brown factice	lb.	.10 @	.16
White factice	lb.	.10 @	.16

VULCANIZING INGREDIENTS

Black hyposulphite	lb.	.19 @	—
Sulphur chloride (jugs)	lb.	.13½ @	.15
" (drums)	lb.	.08 @	.10
Sulphur flour (bbls.)	cwt.	2.75 @	3.30
(bags)	cwt.	2.50 @	3.05
Sulphur, 100 per cent pure,		— @	—
Bergenp't brand (bags)	cwt.	2.45 @	2.80
(bbls.)	cwt.	2.70 @	3.05

Chemical Notes

Soda Ash—There was a continued demand from consuming industries and this demand and the cost of production has kept prices firm. April was a record month and there has been exceptionally good demand since the first of the year. Leading dealers continue to offer light, barrels, at $1.95 to $2.30 per hundred pounds.

Caustic Soda—The market has been along seasonable lines. Contract withdrawals fell off during the close of the period but this was expected at this time of the year. Standard brands, basis 76 per cent are quoted at $3.50 to $3.75 per hundred pounds.

Zinc Oxide—The tire industry continues to be heavy purchasers of this material and the demand has shown a splendid increase since the first of the year. All kinds of zinc oxides are in demand especially French process which is quoted as follows: red seal, barrel car lots, 10 cents; less than car lots, 10¼ cents; white seal, car lots, 12 cents; less than car lots, 12½ cents; green seal, car lots 11 cents, less than car lots 11¼ cents. 10 to 35 per cent, lead sulphate, car lots, 7¼ cents; less than car lots, 7½ cents.

Lithopone—Consumption is full up to production and makers are working to capacity to supply the demand for the tire and other consuming industries. There has been no change in the price and domestic is quoted at 7 cents a pound in bags, barrels, car lots, 7 to 7¼ cents; less than car lots, 7¼ to 7½ cents.

Litharge—As with lithopone rubber makers and other users of this material are largely taking all that is produced. Makers are well sold ahead and consumption promises to be heavy for months to come. Casks are quoted at 10.90 cents a pound; 100 to 500 pound kegs, 14.50 cents; 500 to 2,000 pounds, 13.05 cents; 2,000 to 10,000 pounds, 12.52 cents.

Barytes—The new price of $28.00 a ton for prime Western is now well established as contract purchasers only had the right to the old price of $26.00 up to the 15 of the month. Quite naturally activity has eased up a little in Western but producers are well sold up, Southern off color is still quoted at $15 to $20 a ton.

Orange Mineral — This oxide, both domestic and imported, continues in good demand. Prices were unchanged during the period, Domestic bringing, 14.40 to 15.50 cents a pound; French, 17 cents and English, 15.50 cents.

Blanc Fixe—Producers in this line have had a very profitable season and continue to operate their plants to capacity. The price on dry is quoted at 4 to 4¼ cents a pound and pulp $50 to $55 a ton.

Linseed Oil—The market continues very firm and there is a scarcity of spot oil. For car lots in barrels crushers quote $1.17 per gallon. English oil was quoted at $1.10 to $1.15 per gallon.

Whiting—There was a good demand with consumption more than normal and the rubber makers heavy buyers of the material. Commercial is quoted at $1.00 per hundred pounds, American paris white, $1.15; English cliffstone, $1.50.

Talc—This material is also in heavy demand by the rubber makers and prices of both domestic and imported are firm at $15 to $18 per ton for the former, $20 for French talc, $40, high grade French; $47 to $58, Italian.

Aniline Oil—Demand was along good lines and prices steady at former levels. Drums were offered at 16½ to 17 cents per pound and tanks at works at 16 cents.

Reclaimed Rubber

NEW YORK, May 4, 1923

Despite fluctuations downward in crude, prices for reclaimed have held their own in the past fortnight with but minor changes. Demand is still active with reclaiming plants working practically at capacity. Quotations of this date are as follows:

Standard Reclaims			
Floating Tube	.17	@	.18
Friction	.24	@	.25
Boots and Shoes	.11¼	@	.12
Boots and Shoes (washed)	.13¾	@	.14¼
Mechanical	.10	@	.11
Hose	.10	@	.11
Tires, truck	.09	@	.09¼
Tires, auto	.10	@	.10½
White	.13½	@	.14

Scrap Rubber

NEW YORK, May 4, 1923

There was an easing off of prices in the scrap rubber market during the past ten days. Dealers report that there is practically no factory buying at present. All dealers at present are loaded with large quantities of scrap. They, however, expect that there will be a decided improvement in the market within the next two months, it being anticipated that factories will then be demanding large quantities of scrap. Opinions prevail at present that market prices will not go to any great extent below present levels.

Standard white auto was off from 4 to 5 points during the past week, being quoted $20 to $25 a ton, while mix auto was quoted $11 @ $12 a ton. Bicycle tires remained steady throughout, quoted 10 @ 12 cents, but inner tubes No. 1 were off 1¼ points. Boots and shoes were quoted 2¾ @ 3 cents.

Prices quoted at this date are:

Auto tire peelings	.01	@	.01¼
Standard White auto ....ton	20.00	@	25.00
Mixed auto .....ton	11.00	@	12.00
Bicycle tires	.10	@	.12
Clean solid truck tires	.01¼	@	01½
Boots and shoes	.02¾	@	.03
Arctics, trimmed	.02	@	.02¼
Arctics, untrimmed	.01¼	@	.01¾
Inner tubes, No. 1	—	@	—
Inner tubes, compounded	.04	@	.04¼
Inner tubes, red	.03½	@	.03¾
Battery jars, clean hard rubber	.02	@	.02½
Rubber Hose	.00¾	@	.00¾
Red packing	.01	@	.01¼
White druggist sundries	.04	@	—

Crude Rubber

NEW YORK, May 4, 1923

There has been practically no signs of strength in the crude rubber market during the past two weeks, but dealers do not look for anything like a big break below present levels. Dealers claim that the buyers strike is about ended, and that manufacturers will again be in the market during the last six months of the year. Manufacturers, it is reported, still have fairly large quantities of crude rubber on hand.

Other factors that contributed to the weakness of the present market are: There has been considerable liquidation of crude rubber in London, caused by the failure of a fairly large rubber concern there. Again, there have been about 500 tons a month of crude smuggled from British to Dutch possessions, while large quantities of rubber have been shipped from British possessions on forged permits. At present bills are being drafted to prevent shipments through forged permits.

Although restriction under the Stevenson Act has been tightened, the market as yet has not felt the effect. Concensus of opinion among dealers is that the British will make a determined effort to keep market prices up. Recent cables advise of the increase of exportable percentage from 60 to 65% as a result of the average price of 1s. 3d. to 1s. 6d. for the last three months in the London market. Dealers state that since April 1 to May 4 about 25,000 tons of crude rubber have come into the country. This merely means that there has been a switching of crude from the primary markets to the New York market.

Although there is but little stock of the lower grades of plantations available on the spot, prices have declined in proportion with those of the standards.

Quotations of this date are as follows:

Plantations			
Ribbed Smoked Sheets	.30	@	.30¼
First Latex, spot	.30	@	.30⅛
May, June	.30	@	.30¼
July, December	.30⅝	@	.30⅞
Amber Crepe No. 1, spot	.29	@	—
Amber Crepe No. 2, spot	.28	@	.28¼
Amber Crepe No. 3, spot	.27¼	@	.27½
Light Clean Thin Brown Crepe	.28¾	@	—
Commercially Clean Thin Brown Crepe	.28	@	—
Specky Brown Crepe	.27½	@	.27¾
Roll Brown Crepe, spot	.27	@	.27¼
Paras			
Madeira Fine	.28¼	@	.28½
Acre Fine	.27¼	@	.27½
Up-river Fine	.27	@	.27¼
Up-river Medium	.25½	@	.25¾
Up-river Caucho Ball (shipment)	.27	@	—
Up-river Coarse	.24¾	@	.25
Islands Fine	.26½	@	.26¾
Islands Medium	.24½	@	—
Islands Coarse	.13	@	—
Cameta	.13	@	—
Xingu Ball	.24½	@	.25
Tapajos Fine	.26¾	@	—
Tapajos Medium	.25	@	—
Pontianac			
Prime Pressed	.13	@	.14
Plantation	.07½	@	—
Bangermassin	.08	@	—
Siak Gutta Percha	.20¾	@	—
Prime Macassar	3.00	@	—
Balata			
Surinam Sheets	.80	@	.85
Columbia Block	.60	@	.65
Venezuela Block	.70	@	.75

American Rubber Patents

GRANTED APRIL 17, 1923

1,451,712 Tire Boot. Lloyd T. Peffer and Thomas E. Peffer, Waukesha, Wis.
1,451,719 Dust Cap for the Valves. Thomas Jefferson Stephens, Spokane, Wash.
1,451,804 Lug Ring. August T. J. Bahr, Detroit, Mich., assignor of one-half to Claire Benton Kline, Dormont, Pa.
1,451,820 Tire Tread. Harry M. Fry, Johnstown, Pa.
1,451,827 Resilient Wheel. Ota O. Hobson, Vinton, Iowa.
1,451,913 Vehicle Wheel Evert Kokko, Duluth, Minn.
1,451,975 Reenforcing Fabric for Tires. Thomas Branson, Philadelphia, Pa., assignor to Sibson & Stern, Inc., Philadelphia, Pa.
1,451,977 Tire. William E. Curtis, Wyandotte, Mich.
1,452,073 Automobile Rim. Jose S. Edwards, Helper, Utah.
1,452,089 Resilient Tread for Footwear. Francis A. Nolan, St. Paul, Minn.
1,452,099 Elastic Tire and Method of Making Same. John F. Sipe, New York, N. Y.
1,452,136 Tire Construction. Alfred Ancidoni, Newark, N. J.
1,452,168 Pneumatic Tire. Harlan S. Rector, Chicago, Ill.
1,452,217 Tire. Fred Brown Pfeiffer, Akron, Ohio.
1,452,284 Tire-Inflating Attachment for Disk Wheels. Joseph A. Steinmetz, Philadelphia, Pa.
1,452,291 Resilient Wheel for Vehicles. Joseph L. Donat, Chicago, Ill.
1,452,292 Resilient Wheel for Vehicles. Joseph L. Donat, Chicago, Ill.
1,452,293 Resilient Tire. Joseph L. Donat, Chicago, Ill.
1,452,294 Resilient Wheel. Joseph L. Donat, Chicago, Ill.
1,452,324 Tire Valve. Louis P. Strutz, Corning, N. Y.
1,452,326 Method of Prolonging the Life of Expansible Vulcanizing Cores. James D. Tew, Hudson, Ohio, assignor to The B. F. Goodrich Company, New York, N. Y.
1,452,342 Resilient-Tired Wheel. James Thomas Jones, Maidenhead, England.
1,452,345 Tire Structure for Tractors. Irwin F. Kepler and Arthur A. Robb, Akron, Ohio, assignors to The B. F. Goodrich Co., New York, N. Y.
1,452,423 Vehicle Wheel. James B. Harmon, Helena, Mont.

GRANTED APRIL 24, 1923

1,452,596 Tire Tool. Leon de Fernelmont, Paterson, N. J.
1,452,623 Spring Wheel. Frederick Stitzel, Louisville, Ky.
1,452,782 Spring Wheel. William Jakob Beisel, Port Richmond, N. Y.
1,452,787 Pneumatic Tire. William R. Busenbark, Akron, Ohio.
1,452,795 Wheel With Improved Pneumatic Tire for Motor Vehicles. Henry de Hooydonck, Biarritz, France.
1,452,870 Tire-Inflating Pump. Thomas Morris Davis, Llanelly, Wales.
1,452,891. Rubber-Heel Lift. Clifford H. Oakley, Trenton, N. J.
1,452,892 Resilient Heel Lift. Laurence M. Oakley, Trenton, N. J., assignor to Clifford H. Oakley, Trenton, N. J.
1,452,894 Tread for Auto Tires. John B. Pouk, Streator, Ill., assignor of one-half to Benjamin D. Roberts, Streator, Ill.
1,453,033 Vehicle Tire. Roman Von Krenski, Berlin-Friedenau, Germany.
1,453,034 Method of Vulcanizing Tires. Harry B. Wallace, St. Louis, Mo.
1,453,092 Cushion Wheel. Philip H. Dorsey, Algiers, La.
1,453,123 Mold for Rubber Mats, Etc., Leroy M. Bickett, Watertown, Wis.
1,453,139 Tire Lock. John L. Huston, Boston, Mass., assignor to The Miller Lock Co., Philadelphia, Pa.
1,453,140 Tire Protector. Crusselle B. Jackson, Hartsells, Ala.
1,453,150 Vehicle Tire. Joseph Henry McCormick, South Pittsburg, Tenn.
1,453,181 Steering-Wheel Cover. William F. Ridge, Akron, Ohio.
1,453,183 Ground-Gripping Chain for Automobile Tires. James E. Robison, Denver, Colo.
1,453,189 Cushion Wheel. Earl D. Snyder, Albany, Ill.
1,453,199 Resilient Wheel and Air Tire to be used Therewith. Jacobus Spijker, Amsterdam, Netherlands.
1,453,217 Pneumatic Tire. Daniel M. Weigel, Chicago, Ill., assignor to The Wire Cord Co., Akron, Ohio, a Corporation of Delaware.
1,453,224 Automobile Tire. Joseph Greszczuk, Brooklyn, N. Y.
1,453,247 Spring Wheel. Charles A. Kiggins, Weskan, Kans.

Cotton Market

(Continued from Page 105)

cent decline in yield per acre was the smallest cotton crop in more than 25 years.

Increased Consumption

"The amount of cotton remaining on hand at the close of the crop year ending July 31, 1922, was only one-half the volume of the preceding year, due to a marked increase in both foreign and domestic consumption, coincident with a small crop.

"Higher prices had caused growers to plant an acreage in 1922 about equal to that of normal years, but due to unfavorable growing conditions, primarily depredations of the boll weevil, the crop harvested last autumn was far below the world's requirements.

"Since that time domestic consumption has continued to increase, establishing a new high record during the first quarter of 1923. Export demand, which was fairly heavy at the beginning of the cotton year, has gradually declined due to rising prices, and the March and April totals were abnormally low.

Importance of American Crop

"The price of American cotton had apparently passed the figure at which the remainder of the world would buy freely. Even with this decreased foreign demand, it is probable that the carry-over at the end of the current cotton year will not exceed a million bales, a figure smaller than even the pre-war average. In view of the fact that the cotton manufacturing industry of the world will no longer be able to draw upon heavy accumulations of raw cotton carried over from previous years, and can therefore consume no more than is being produced currently, the size of the cotton crop now being grown in this country assumes more than usual importance, inasmuch as the American crop forms so large a proportion of the world total as to dominate the situation.

The Yield Per Acre

"Growing conditions, the factor least capable of forecast, will exert the most important influence upon the cotton crop. A difference between the maximum and minimum yields of 215 and 125 pounds to the acre, both of which have been attained since 1900, would amount to 6,500,000 bales, or a whole year's domestic consumption.

"If the average yield per acre during the past ten years is taken as the most reasonable estimate, the result would be a crop of about 12,000,000 bales, substantially larger than that of the past two years, but not large enough to prevent a continuation of prices high in relation to the general price level.

New Jersey Zinc Earns $1,865,456

Net income for the New Jersey Zinc Company for the quarter ending March 31, 1923, totals $1,865,456, after charges and taxes, compared with net income of $1,638,835 in the preceding quarter and $1,065,101 for the corresponding period in 1922 and $244,345 in 1921.

New Incorporations

DELAWARE

Equitable Rubber Products Co., to deal in rubber and rubber products. $5,000,000. Incorporators: M. L. Rogers, L. A. Irwin and W. G. Sanger. Principal office, Wilmington, Delaware.

Evernu Rubber Heel Corporation. $7,500,000. Agent, U. S. Corporation Co., Wilmington, Delaware.

American Cactus Rubber Products Co., to deal in rubber products of all kinds. $500,000. Incorporators: M. M. Lucey, M. B. Reese, L. C. Browne — Wilmington, Delaware. Delaware Agent, Colonial Charter Co., Wilmington, Delaware.

INDIANA

St. Paul Tire & Rubber Company. $80,000. Directors: William F. Collins, Gertrude M. Collins and Harry A. Favors. Principal office, Indianapolis, Indiana.

KENTUCKY

Co-Rim-Co Corporation, to manufacture collapsible rims. $500,000. Incorporators: V. Lachemalle, F. E. Balcom, B. F. Hardesty—Louisville, Kentucky. Principal office, 206 Central avenue, Louisville, Kentucky.

NORTH CAROLINA

Pope Tire & Battery Co., to manufacture tires, tubes and batteries. $100,000. Incorporators: W. L. Pope, I. L. Stevenson, L. O. Gibson, I. L. Milholland, C. Stinson, C. H. Turner, C. C. Tharpe, and D. L. Raymer—Statesville, N. C. Principal office, Statesville, N. C.

NEW JERSEY

New Pressman Tire & Rubber Co., to manufacture tires. $2,000,000. Incorporators: H. Pressman, Philadelphia, Pennsylvania; J. E. Monteith, East Orange, New Jersey; H. G. Tully, Glen Ridge, New Jersey. Principal office, 776 Broad street, Newark, New Jersey.

Harry W. Huffnagle, Inc., to deal in rubber tires of all kinds. $100,000. H. W. Huffnagle, president; R. P. Read, secretary; C. P. Tilton, treasurer. Principal office, Guarantee Trust Building, Atlantic City, New Jersey.

Hand and Graney Tire & Rubber Co. $5,000. Incorporators: P. C. Graney, N. Hand and T. D. Hand. Attorney, C. A. Hand, 253 Broadway, New York City.

Nestler Products Corporation, to manufacture rubber goods. $10,000. Incorporators: J. C. Kimball and B. Cahn. Attorney, J. Blumenthal, 1475 Broadway, New York City.

Auerbach Tire Works, Inc., to manufacture and deal in tires. $10,000. Incorporators: M. Weinberger, C. Auerbach and W. Auerbach—Brooklyn New York.

C. & K. Tire Protector Co., Inc., to deal in tires and accessories. $2,500. Incorporators: L. R. Caragol, F. W. Krausi, C. M. Lawless—Brooklyn, New York. Principal office, Brooklyn, New York.

J. P. Byrne & Co., Inc., to manufacture tires. $10,000. Incorporators: J. P. Byrne, H. L. Caldwell, B. E. Shove—Syracuse, New York.

OHIO

The Liberty Rubber Company. $30,000. Incorporators: Frank Zacher, Frances Zacher, Adam Tomick, George Hanzel and Stephen Hanic.

Apex Rubber Products Co. $25,000. Incorporators: N. O. Mather, Lloyd A. Fassett, Charles H. Lahr, Grace L. Kellar and L. Allan Martin.

The Good Rubber Co. $10,000. Incorporators: W. D. Good and E. K. Good. Principal office, Akron, Ohio.

Ashland Tire & Rubber Co., to manufacture rubber products. Incorporators: C. D. Darrah, S. H. Grabill, G. E. Brown, J. E. Mayner and R. W. Topping. Principal office, Ashland, Ohio.

Kent and Moynihan with Northern

R. W. Kent, formerly of the Republic Rubber Co., is now factory manager of the Northern Tire Company, which is resuming operation of the Biltwell Tire plant at Barberton, Ohio. Owen Moynihan, formerly with the Malay Rubber Co., is now in charge of sales. The Northern Tire Company contemplates turning out about 400 tires a day, according to L. J. Schott, former president of the Amazon Rubber Co. now president of the newly organized concern.